THE IRON TRADE REVIEW

Published Weekly
VOL. LXVI. NO. 23

CLEVELAND, JUNE 3, 1920

Entered as second-class matter at the post-office in Cleveland, Ohio, under the act of March 3, 1879

Five Dollars a Year
Single Copy 15 Cents

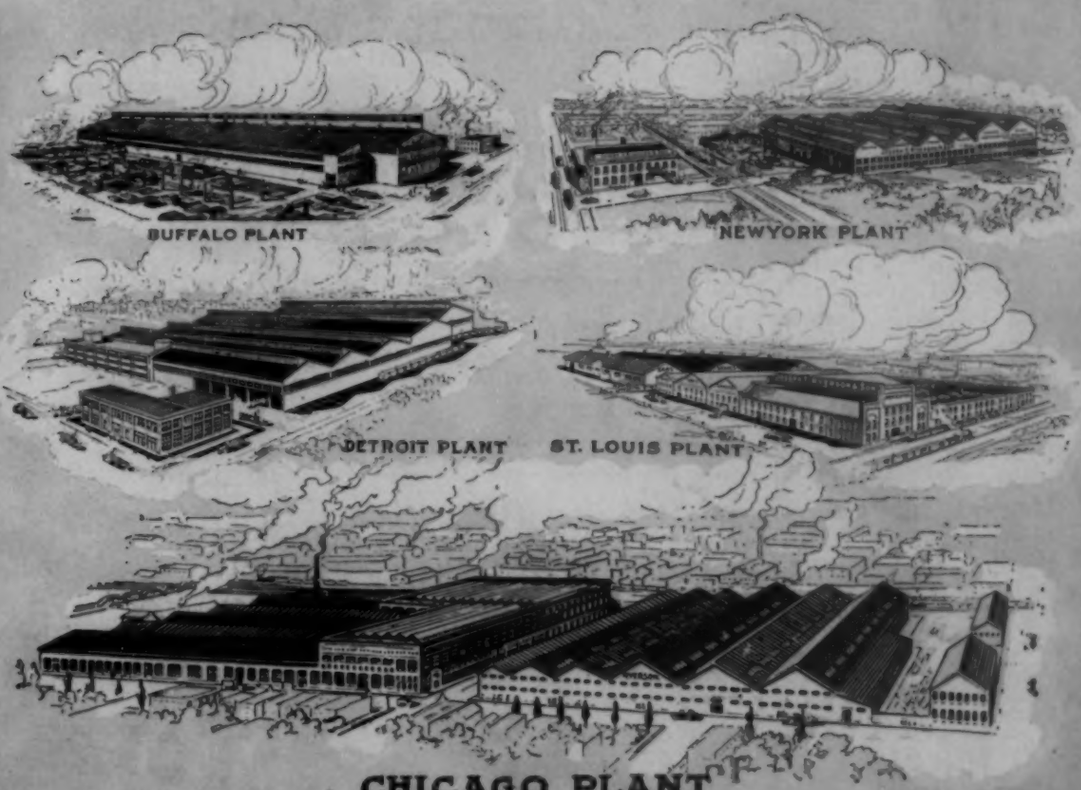
GENERAL LIBRARY
JUN 4 1920
UNIV. OF MICH.

Ryerson Steel-Service

The Ryerson Organization is founded upon the basic principles of practical service and fair dealing.

Developed with a full realization that the best service is dependent upon the ability as well as the desire to serve.

Conducted along lines of highest business integrity and endeavoring always to give intelligent, prompt and direct personal service.



Advertisers' Index, pages 270, 271
Engineering Directory, pages 228, 229, 230
Contents, page 1584 (Editorial)
"Where-to-Buy", page 172
Classified Advertisements, pages 240-271

THE KOPPERS CO.

DESIGNERS AND BUILDERS OF

By-Product Coke Plants
Benzol Recovery Plants
Motor Fuel Recovery Plants
Ammonia Recovery Apparatus
Tar Distilling Plants
By-Product Gas Producers
Gasoline Absorption Plants

CONSULTING ENGINEERS
on the operation of
By-Product Coke and Gas Plants and their Auxiliaries

Properties Examined
Engineering Reports and Financial Statements Prepared
Coals Analyzed and Tested

THE KOPPERS COMPANY

PITTSBURGH, PA.

THE IRON TRADE REVIEW

Vol. LXVI Cleveland, June 3, 1920 *No. 23*

Works Operations On Upturn

Movement of Blockaded Cars Is Best Since Switchmen's Strike—Production Growth Continue of Spotty Character However Due to Car Shortage—Market Conditions Show Dissimilarity—May Iron Output Gains and Active Stacks Grow

MORE shipments of iron and steel are moving principally because of the release of loaded cars which have been penned behind embargoes, than at any time in the eight weeks of the freight blockade. New consignments leaving producers' plants also are increasing though practically no progress yet has been made in clearing away the heavy accumulated stocks of finished material. Gradually this extending traffic is working its way back to the mills and works in the form of deliveries of coal and other raw materials and operations are beginning to respond. Mahoning valley steelworks began the week 70 to 80 per cent active against less than 50 per cent previously. Blast furnace operations in that district show 14 stacks active out of 25. The east is doing better but lack of coke is being felt keenly. Pittsburgh and Chicago on the whole show a practically unchanged situation. Lack of cars remains the offsetting factor to any general or pronounced improvement of operations and production still is under a sharp check.

More Stacks In Blast

The most favorable point to the May pig iron statistics was the increase in the number of active furnaces. This was 17, as the stacks blowing at the end of the month stood at 295 compared with 278 on the corresponding date in April. The total output for May was 2,853,276 tons compared with 2,752,670 in April, and 3,375,768 tons in March. The gross gain of 100,606 tons of May over April mainly was due to the one-day longer month, and the daily rate of output actually was about the same, being 92,041 tons as against 91,754 tons for the preceding month.

Lake ore shipments in May made a better showing than expected, reaching approximately 6,400,000 tons, or 2,392,231 tons less than in the corresponding month of 1918 against which the present season's movement is being compared. Up to June 1, 11 per cent of the expected season's shipments by water had passed over the lower lake docks, compared with 17 per cent in 1919 and 15 per cent in 1918.

New Buying Heavier

New buying of finished steel has been more in evidence in certain lines the past week; in others it has drooped, thus continuing the irregular condition of the market. Plates have picked up considerably in the east where the Pennsylvania railroad has come out for 15,000 tons. A large independent company has opened its third quarter books at 4.00c Pittsburgh on plates, shapes and bars. In the west, the leading interest continues to book contracts for 1921 delivery at 2.35c Pittsburgh. The automobile trade is a less prominent factor in sheets. There are reports that some of the steelmakers taking their cue from the attitude of the federal reserve board toward the pleasure car industry, are less inclined to bid for future tonnage of this character. Some cancellation of sheets and parts by the motor companies has caused comment.

Prices Ease Abroad

Indications in Great Britain are that iron and steel prices are passing the peak, according to the weekly market cable. Some products are easier. Export orders however still are being placed in surprisingly good tonnage with American mills and some of these are for England. The latter has purchased 30,000 tons of ship plates which are part of the surplus held by the shipping board. Other recent sales to England consisted of 6000 tons of wire rods and 20,000 tons of billets and blooms. An Indian steel company has placed six tin plate mills in the United States against British competition, the price being $80,000 lower. A strike of stationary engineers has thrown out 20,000 steel workers in the Sheffield district.

An outstanding feature of the export market is the increased negotiations by German interests for American raw and semifinished material including pig iron, sheet bars and wire rods. One order for 5000 tons of Alabama pig iron for German and Swedish account was placed at $42 to $44 Birmingham.

THE IRON TRADE REVIEW

Devoted to the Iron, Steel, Foundry and Metalworking Industries

Published Every Thursday by

THE PENTON PUBLISHING CO., CLEVELAND

Member, Audit Bureau of Circulation and Associated Business Papers, Inc.

BRANCH OFFICES

CHICAGO - - - - - - - - - 1147 Peoples Gas Bldg.
CINCINNATI - - - - - - - 501-505 Commercial Tribune Bldg.
NEW YORK - - - - - - - - 2203-2206 No. 220 Broadway
BOSTON - - - - - - - - - 426 Old South Bldg.
PITTSBURGH - - - - - - - - 2148-49 Oliver Bldg.
WASHINGTON, D. C. - - - - - - - 40 Metzerott Bldg
BIRMINGHAM, ENG. - - - - - - - Prince's Chambers
LONDON, ENG. - - - - - - - 16 Regent St., S. W. 1

Cable Address, IROTRAPEN, London

Subscription, United States, Cuba and Mexico, $5 per year. Canada $7.50 and other Foreign Countries, $10 per year.

Entered at the Postoffice at Cleveland as Second Class Matter

Copyright 1920 by the Penton Publishing Co.

IN THIS ISSUE

PAGE

Iron and Steel Market Review 1583
Editorials 1584–1858
Iron, Steel and Scrap Prices 1586, 1648, 1652
Index to Market Reports 1586
Iron and Steel Markets ..... 1587 to 1595
Foreign Markets 1596, 1597, 1361
Passing Peak in British Prices 1596
American Iron and Steel Institute Meeting 1598
Spirit of Unity Will Rule Land 1600
Experts Outline Progress of Industry—Speak Before Iron and Steel Institute 1602–1603
Rolling Rails From Annular Blooms 1604
Making Acid Open-Hearth Steel 1607
Nation Must Seek Foreign Oil Fields 1614
Effect of Heat Treating Steel 1611
Testing Metals Under Repeated Stress 1615
Selecting Steel Castings Intelligently 1617
Gray Iron Suitable for Many Purposes 1618
Specifying Malleable Iron Castings 1620
Selecting the Proper Brass Castings 1621
Aluminum Castings Have Many Uses 1622
Engineers Discuss Timely Topics 1626
Belgium Lighting More Blast Furnaces 1631
Rail Strike Slows Up Output of France 1631
Rail Priorities Plan Postponed 1632
Expect Deflation to Be Orderly 1637
May Machinery Sales Restricted 1639
Machine Tool Trading Inactive 1640

Judge Gary and the Presidency

IF THE final decision rested with the business interests of this country there is little doubt that the next president of the United States would be a man thoroughly trained in the accomplishment of results through business methods and efficiency. And judging from the enthusiasm with which the suggestion of his eminent fitness for that high office was received at the dinner of the American Iron and Steel institute in New York last week, Judge Gary combines those qualities which would make him an ideal business candidate. The choice of the iron and steel industry in this respect practically would be unanimous.

Whether or not the exigencies of practical politics, or his own wishes, ever would permit Judge Gary's name to go before the country, the faith and confidence of his associates and competitors which the demonstration at the institute dinner signified, are such as fall to the fortunate lot of few men. Mr. Schwab declared, the United States Steel Corp. under the wise and liberal policies put in effect by its guiding genius has been of inestimable value to the whole iron and steel industry of the United States. No one conversant with the facts can question that statement. The same qualities that had made the Steel corporation great and respected, would serve the country well with Judge Gary in the presidential chair, said Mr. Schwab.

Appreciation of Judge Gary and his work have become proverbial with each passing meeting of the American Iron and Steel institute. On this occasion, however, it was especially marked and stood forth as the one commanding feature. Joined with the sober recognition by the assembled manufacturers of the serious problems, political and commercial that confront the country, it suggested the thoughts which are running in men's minds today as to the most effective means to be employed to bring the nation back to a condition of thrift and common balance. A national business administration with Judge Gary as its head, fills the wells of hope and fires the patriotic imagination. It would speed the redemption of the country to those paths of industry and of sound thinking which of the past have made it truly great.

Local Chapters Perform Service

EVERY succeeding convention of the national engineering organizations supplies further evidence to prove that general topics rather than discussions on highly specialized subjects are receiving the biggest share of the attention of the men who attend these meetings. This fact was again emphasized last week at St. Louis where the subjects of valuation and appraisal, industrial housing, river transportation, etc., were discussed by members of the American Society of Mechanical Engineers. The session on castings, which attracted more attention than any other session devoted strictly to technical subjects, was marked by brief but enlightening discussion which unfortunately was brought to a close before many, eminently qualified, had an opportunity to speak.

The experience at St. Louis is typical of the meetings of all of the larger organizations. As a rule, the general topics on economics, policies of administration, etc., receive considerable attention because the average engineer or manufacturer who attends these meetings does not have a chance during the daily routine of business to study the general problems as closely as he would like. Therefore, he is interested in papers on general subjects affecting business, especially if the paper is presented by an eminent authority.

On the other hand, there are many engineers, metallurgists and technical men who attend conventions for the purpose of hearing the discussions on technical papers. On account of the great amount of discussion which sometimes is aroused during these sessions, the meetings usually have to be adjourned before all interested persons have had the opportunity to present their views. This is especially true when

more than five papers are scheduled for a single session, which often is the case.

The solution for this difficulty seems to be developing automatically. During the past year, local chapters of the national engineering organizations, as well as local clubs of various kinds, have enjoyed the most successful year of their existence. Possibly the reason for this lies in the fact that with only one paper scheduled during the evening, every member of the audience has a fair chance to thoroughly discuss the subject, whereas no such opportunity is given at the general meetings of the national organizations.

It is pleasing to note that most of the larger engineering societies are strongly encouraging the formation of local chapters. There can be no denying that this is a wise course to pursue, because there is a wide and important field for the local chapters, whose work can in no way conflict with that of the parent body. On the other hand, as pointed out above, the meetings of the local organization may be said to supplement those of the national societies. The tendency toward building up a strong national organization through the formation of local chapters, promises not only to strengthen the already formidable power of the engineering and professional man of the country, but also provides a more satisfactory plan for dealing with exhaustive discussion on important technical matters.

Apply Engineering to the Farm

MANUFACTURERS of steel products probably would combat the statement that their recent rush of orders is due to the demand of the nation's farmers. However, that this is actually the case is the opinion of Charles C. Parlin, commercial research expert, of the Curtis Publishing Co., who recently addressed stove manufacturers at Boston. About one-fifth of the countries' male population is engaged in agricultural pursuits and this fifth with unprecedented receipts from the crops of the last few years, represents a tremendous buying factor, said the speaker. The question naturally arises, if our present activity is dependent upon the farmers, is it then to the farmer that we must look for our future industrial status? If the farmer has made prosperity, may he not also cause a slump? His help has been gradually taken away from him by the demands of industrial centers. It is true that with reduced production, prices of farm products undoubtedly will remain high but is it not possible that the total receipts of the farmer even at the higher prices will be decreased through his loss of production. In addition to this, it must be considered whether or not the farmer's demand is to be a permanent demand. As his help decreases, will not his demand for farm implements also decrease. If he has less than his normal yield, will he need as large truck equipment to market it? These are some of the interesting statements set forth by Mr. Parlin.

There is a cry among manufacturers for a larger number of automatic machines which will keep up production in spite of a decreasing number of workers. In view of Mr. Parlin's assertion, that the prevailing expansion of business is due largely to the farmer, this movement in the direction of labor-saving machinery should be applied with equal emphasis to agricultural production. If there is any one thing which the country needs more than another today, it is agricultural machinery, which will enable the farmer to get the maximum yield with minimum labor. Some concerted action along this line not only would help relieve the falling food production but would at the same time contribute toward keeping up the demand for machinery and other finished iron and steel products.

Why Japan Bought Copper

AT LEAST one question which puzzled the minds of the copper trade of America and England in recent months has been answered by the recent financial panic in Japan. During 1919 Japan was an extremely heavy importer of American copper, taking about 27,000 tons the first nine months of the year, whereas in previous years she had been a large exporter of the metal. Several theories were advanced for the reversal of the usual trade movement. One which was given particular emphasis both in London and New York was that Japan was laying in supplies for future military uses, much as Germany did in the years before the world war.

It develops, however, that the heavy Japanese purchases were partly speculative and based on that country's greatly stimulated industrial and financial activities, due to the war. Recently, the financial strain reached the cracking point and speculative holders of commodities were forced to liquidate. The echo was heard in the copper market all over the world. Reselling by Japanese interests brought about a break of £8 a ton in the London standard market in one day, affecting electrolytic in London also, making that market temporarily less favorable for renewed imports of American copper. Recently a conference was held in Japan, attended by representatives of the copper miners, exporters and importers, with a view to the relief of the Japanese copper market. It was resolved to restrict production, discontinue importations and discourage exportation of accumulated material; also to provide funds for purchasing stocks offered at a loss.

Measures like this would scarcely have been necessary if copper had been accumulated for the account of the Japanese government or for munition makers. Consequently if would seem that one more alarmists' bubble has been pricked.

Iron and Steel Prices

CORRECTED TO WEDNESDAY NOON

SCRAP, WAREHOUSE, ORE AND OTHER PRICES ON PAGES 1648 AND 1652

Pig Iron

Bessemer, valley	42.50
Bessemer, Pittsburgh	43.90
Basic, valley	43.00 to 43.50
Basic, Buffalo	41.00 to 43.00
Basic, Pittsburgh	44.40 to 44.90
Basic, delivered, eastern Pa.	43.50 to 44.50
Malleable, valley	43.00
Malleable, Pittsburgh	44.40
Malleable, Chicago, furnace	43.50
Malleable, Buffalo, furnace	46.25
Malleable, delivered eastern Pa.	47.00 to 48.00

FOUNDRY IRON SILICONS

No. 2 Northern	1.75 to 2.25
No. 2 Southern foundry	1.75 to 2.25
No. 2X Eastern and Virginia	2.25 to 2.75
No. 1X Eastern	2.75 and up
No. 1 Chicago	2.25 to 2.75
No. 2 foundry Eastern	1.75 to 2.25

No. 1X, eastern delivered Phila.	$48.10 to 50.90
No. 1X, Buffalo	48.00
No. 1 foundry Chicago, furnace	45.25
No. 2 foundry, valley	44.00
No. 2 foundry, Pittsburgh	44.50 to 45.40
No. 2 foundry, Buffalo	45.00
No. 2 foundry, Buffalo, Boston del	48.90 to 49.90
No. 2X, Buffalo, Boston del.	50.15 to 51.15
No. 2 foundry, Chicago furnace	43.00 to 45.00
No. 2 foundry, Ironton furnace	44.00 to 45.00
No. 2 foundry, Cleveland furnace	43.10 to 44.00
No. 2X, eastern, del., Phila.	46.85 to 49.35
No. 2X, eastern, N. J., tidewater	47.10 to 49.35
No. 2X, Pennsylvania, Boston del.	48.90 to 51.15
No. 2 foundry, Pa., Boston del.	47.90 to 49.90
No. 2X, foundry, Buffalo furnace	46.25
No. 2 foundry, del., Philadelphia	45.60 to 48.10
No. 2 foundry, N. J., tidewater	46.10 to 48.10
No. 2 southern, Birmingham	42.00 to 44.00
No. 2 southern, Cincinnati	45.60 to 47.60
No. 2 southern, Chicago	47.00 to 49.00
No. 2 southern, Phila.	45.50 to 47.50
No. 2 southern, Cleveland	45.00 to 47.00
No. 2 southern, Boston	50.00
No. 2 southern, St. Louis	46.30 to 48.30
No. 2X, Virginia, furnace	45.25 to 46.25
No. 2X, Virginia, Philadelphia	49.25 to 50.25
No. 2X, Virginia, Jersey City	49.65 to 50.65
No. 2X, Virginia, Boston	49.95 to 50.95
Gray forge, valley, Pittsburgh	42.40 to 43.40
Gray forge, eastern Pa.	44.00 to 44.50
Silveries, 8%, furnace	55.00 to 58.00
Ohio Silveries, 8%, Chicago	56.30 to 59.30
Tennessee Silveries, 8%, Chicago	60.30
Low phos. standard, Phila.	55.80
Low phos. Lebanon, furnace	47.00
Low phos. stan. valley del., Pitts.	51.40
Charcoal, Superior, base, Chicago	57.50

Coke

(At the ovens)

Connellsville furnace	$12.00 to 15.00
Connellsville foundry	12.00 to 15.00
Pocahontas furnace	12.50 to 13.50
Pocahontas foundry	12.50 to 13.50
New River foundry	13.50 to 14.00
New River furnace	12.50 to 13.50
Wise county furnace	12.00 to 14.00
Wise county foundry	12.50 to 14.00

Ferroalloys

Ferromanganese, 80 per cent, delivered, domestic metal	$200.00 to 250.00
Ferromanganese, 80 per cent, English c.i.f. Atlantic ports	195.00
Spiegel, 18 to 22 per cent furnace spot	75.00
Ferrosilicon, 50 per cent, spot and contract, delivered	83.00 to 85.00
Ferrotungsten, standard, per pound contained, furnace	90c to 1.10
Ferrochrome, 60 to 70 per cent chromium, 6 to 8 per cent carbon, per pound contained, maker's plant	17c to 19c
Ferrovanadium, 30 to 40 per cent per pound contained, according to analysis	6.50 to 8.00
Ferro carbon-titanium, carloads, producers plant, per net ton	200.00
Bessemer, ferrosilicon, 10 per cent	62.50 to 64.50
Bessemer, ferrosilicon, 11 per cent	65.80 to 67.80
Bessemer, ferrosilicon, 12 per cent	69.10 to 71.10

Prices at Jackson and New Straitsville, O.

Semifinished Material

BILLETS AND BLOOMS

(4 x 4 inch)

Open-hearth, Pittsburgh	$65.00 to 70.00
Open-hearth, Youngstown	65.00 to 70.00
Open-hearth, Philadelphia	64.10 to 74.10
Bessemer, Pittsburgh	65.00 to 70.00
Bessemer, Youngstown	65.00 to 70.00
Forging, Pittsburgh	80.00 to 90.00
Forging, Philadelphia	79.10 to 89.10

SHEET BARS

Open-hearth, Pittsburgh	$75.00 to 80.00
Open-hearth, Youngstown	75.00 to 80.00
Bessemer, Pittsburgh	70.00 to 75.00
Bessemer, Youngstown	70.00 to 75.00

SLABS

Pittsburgh and Youngstown	65.00 to 70.00

WIRE RODS AND SKELP

Wire rods, Pittsburgh	$70.00 to 75.00
Grooves skelp, Pittsburgh	3.25c to 4.00c
Sheared skelp, Pittsburgh	3.45c to 4.00c

Shapes, Plates and Bars

(In cents per pound)

Structural shapes, Pittsburgh	2.45c to 3.75c
Structural shapes, Philadelphia	2.70c to 4.25c
Structural shapes, New York	2.72c to 4.27c
Structural shapes, Chicago	2.72c to 3.72c
Tank plates, Pittsburgh	2.65c to 3.75c
Tank plates, Chicago	2.92c to 4.02c
Tank plates, Philadelphia	2.90c to 4.25c
Tank plates, New York	2.92c to 4.27c
Bars, soft steel, Pittsburgh	2.35c to 4.00c
Bars, soft steel, Chicago	2.62c to 3.52c
Bars, soft steel New York	2.62c to 4.27c
Bars, soft steel, Philadelphia	2.60c to 4.25c
Bar iron, common, Phila.	4.00c to 4.25c
Bar iron, common, Chicago	3.75c to 4.50c
Bar iron, common, Cleveland	3.75c
Bar iron, common, New York	4.02c to 4.27c
Bar iron, common, Pittsburgh	4.00c to 4.50c
Hard steel bars, Chicago	3.75c to 4.00c

Rails, Track Material

Standard bessemer rails, mill	$45.00 to 60.00
Standard open-hearth rails, mill	47.00 to 62.00
Relaying rails, light, St. Louis	52.00 to 55.00
Relaying rails, Pittsburgh	50.00 to 55.00
Angle bars, Pittsburgh base	3.00c to 4.00c
Angle bars, Chicago base	2.75c
Light rails, 25 to 45, mill	2.45c to 3.75c
Spikes, railroad, Pittsburgh	4.00c to 4.25c
Track bolts, Pittsburgh	6.00c to 6.50c
Track bolts, Chicago	4.62c
Track spikes, Chicago	3.62c
Tie plates, Chicago	2.75c to 2.90c

Wire Products

(100 lbs. to jobbers, carloads; retailers, 5c more)

Wire nails, Pittsburgh	$3.25 to 4.50
Plain wire, Pittsburgh	3.00 to 3.75
Galvanized wire, Pittsburgh	3.70 to 4.45
Barbed wire, painted, Pittsburgh	3.40 to 4.15
Barbed wire, galvanized, Pitts.	4.10 to 4.85
Polished staples, Pittsburgh	3.40 to 4.15
Galvanized staples, Pittsburgh	4.10 to 4.85
Cut nails, Pittsburgh, l. c. l.	6.195
Coated nails per count keg, Pitts.	2.85 to 4.10c

Market Report Index

Weekly Market Review	1583
Pig Iron	1587
Coke	1589
Bars	1590
Nuts, Bolts, and Rivets	1590
Structural Shapes	1590
Sheets	1591
Merchant and Cast Pipe	1591
Plates	1591
Tin Plate	1592
Scrap	1592
Semifinished Steel	1593
Wire	1593
Cars, and Track Materials	1593
Nonferrous Markets	1594
Export Market	1594
Ore	1595
Foreign Markets	1596, 1597, 1631
Coke By-Products	1633
Machine Tools	1640

Chain, Piling, Strip Steel

(In cents per pound)

Chain, 1 in. proof coil, Pitts.	6.25c to 6.75c
Sheet piling, base, Pittsburgh	2.55c to 3.65c

Cold rolled strip steel, hard coils, 1⅛ inches and wider by 0.100 inch and heavier, base per 100 pounds, 8.50c to 10.00c.

Sheets

(In cents per pound)

SHEET MILL BLACK

No. 28, open-hearth, Pitts.	4.35c to 7.50c
No. 28, bessemer, Pitts.	4.35c to 7.50c
No. 28, open-hearth, Chi.	4.62c to 8.27c

TIN MILL BLACK

No. 28, open-hearth, Pitts.	4.35c to 9.00c
No. 28, bessemer, Pitts.	4.35c to 9.00c

GALVANIZED

No. 28, open-hearth, Pitts.	5.70c to 8.50c
No. 28, bessemer, Pitts.	5.70c to 8.50c
No. 28, open-hearth, Chi.	5.97c to 8.92c
No. 28, open-hearth, Philadelphia	10.00c to 10.50c

BLUE ANNEALED

No. 10, open-hearth, Pitts.	3.55c to 7.00c
No. 10, bessemer, Pitts.	3.55c to 7.00c
No. 10, open-hearth, Chi.	3.82c to 6.77c
No. 10, open-hearth, Phila.	3.80c to 7.25c

FULL SHEET SCHEDULE PAGE 1652

Tin Plate

(Per 100 lb. box)

Tin plate, coke base, Pitts.	$7.00 to $8.50

Iron and Steel Pipe

Base Pittsburgh to Jobbers Carloads

Base, Pittsburgh	Black Galv. Per cent off
⅜ to 3 in., butt steel	54 to 57½ 40½ to 44
⅜ to 1½ in., butt, iron	24½ to 34½ 8½ to 18½

FULL PIPE SCHEDULE PAGE 1652

Boiler Tubes

Steel, 3½ to 4½ inches, c. l.	30½ to 40½
Iron, 3½ to 4½ inches, c. l.	11

Cast Iron Water Pipe

Without War Freight Tax

(Class B Pipe)

Class A pipe is $2 higher than Class B

Four-inch, Chicago	79.80
Six-inch and over, Chicago	76.80
Four-inch, New York	79.30 to 80.20
Six-inch and over, New York	76.30 to 77.20
Four-inch, Birmingham	73.00
Six-inch and over, Birmingham	70.00

Hoops, Bands, Shafting

Hoops, Pittsburgh	3.05c to 5.50c
Bands, Pittsburgh	3.05c to 5.50c
Hot rolled strip steel, Pitts. stamping quality	5.50c to 7.00c
Cold finished steel bars, Pitts., base	4.10c to 6.50c

Rivets

Structural rivets, Pittsburgh	4.50c
Boiler rivets, Pittsburgh	4.60c
Rivets ⅞ in. and smaller, Pitts.	50 off

Nuts and Bolts

(Prices f.o.b. Pittsburgh)

CARRIAGE BOLTS

(⅜ x 6 inches, smaller and shorter)

Rolled thread	40–5 off
Cut thread	30–10 off
Larger and longer	30 off

MACHINE BOLTS

(⅜ x 4 inches, hot pressed nuts)

Rolled thread	40–10–5 off
Cut thread	40–5 off
Larger and longer	30–10 off
Plow bolts Nos. 1, 2 and 3 heads	40 off
Other style heads	20% higher
Stove bolts in packages	70–10 off
Stove bolts in bulk	70–10–2½ off
Cold pressed semifinished hexagon nuts ⅝ in. and larger	60–5 off
Cold pressed semifinished hexagon nuts ⅝ in. and smaller	60–5 off
Gimlet and cone point lag screws	50 off

NUTS

Hot pressed, square blank	2.00c off
Hot pressed, square tapped	1.75c off
Hot pressed, hexagon blank	2.00c off
Hot pressed, hexagon tapped	1.75c off
Cold pressed, square tapped	1.75c off
Cold pressed, square blank	2.00c off
Cold pressed, hexagon blank	2.00c off
Cold pressed, hexagon tapped	1.75c off

Prices Present and Past

Yesterday, a month ago, three months ago and a year ago

Prices are those ruling on the largest percentage of sales, at the dates named

	Prices June 2 1920	Average prices May 1920	Feb. 1920	June 1919
Bessemer, valley, del., Pittsburgh	$43.90	$43.90	$43.15	$29.35
Basic, valley, delivered, Pittsburgh	44.40	44.65	43.65	27.15
•No. 2 Foundry, val. del. Pittsburgh	45.40	45.40	42.40	28.15
•No. 2 Foundry, Chicago, furnace	43.00	43.00	42.25	26.75
Lake Superior charcoal, Chicago	57.50	57.50	55.63	31.75
Malleable, valley	43.00	43.00	43.00	28.65
Malleable, Chicago	43.50	43.50	42.75	27.25
•Southern, No. 2 Birmingham	42.50	42.00	40.00	25.25
•Southern Ohio, No. 2, Ironton	44.00	44.00	43.00	26.75
Basic, eastern del., eastern Pa.	44.00	44.00	40.50	25.50
••No. 2X, Virginia, furnace	46.25	45.75	42.75	26.50
••No. 2X, eastern del., Philadelphia	46.90	46.90	45.00	29.60
Gray forge, valley del., Pittsburgh	42.40	42.40	41.40	27.15
Ferromanganese, 80 per cent, delivered	200.00	200.00	160.00	114.00
Sheet bars, bessemer, Pittsburgh	70.00	70.00	61.25	38.00
Sheet bars, open-hearth, Pittsburgh	75.00	75.00	65.00	41.50
Billets, bessemer, Pittsburgh	70.00	78.75	65.00	41.50
Billets, open-hearth, Pittsburgh	70.00	70.00	61.25	38.00
Steel bars, Pittsburgh	3.25c	3.25	3.85	2.35
Steel bars, Chicago	3.52	3.52	2.62	2.62
Iron bars, Philadelphia	4.25	4.25	3.75	2.595

	Prices June 2 1920	Average prices May 1920	Feb. 1920	June 1919
Iron bars, Cleveland	$3.75	3.75	3.75	2.52
Iron bars, Chicago mill	3.75	3.75	3.44	2.53
Beams, Chicago	3.72	3.72	3.72	2.72
Beams, Pittsburgh	3.25	3.25	3.15	2.45
Beams, Philadelphia	3.75	3.875	3.75	2.695
Tank plates, Pittsburgh	3.50	3.50	3.70	2.65
Tank plates, Chicago	4.02	4.02	2.92	2.92
Tank plates, Philadelphia	4.00	4.00	4.25	2.895
Sheets, blk., No. 28, Pittsburgh	7.00	7.00	6.00	4.30
Sheets, blue anld., No. 10, Pittsburgh	5.00	5.00	5.50	3.50
Sheets, galv., No. 28, Pittsburgh	7.50	7.50	7.00	5.65
Wire nails, Pittsburgh	4.00	4.00	4.20	3.25
Connellsville furnace coke	14.50	12.00	6.00	3.85
Connellsville foundry coke	14.50	12.50	7.00	4.65
Heavy melting steel, Pittsburgh	25.75	25.50	23.15	17.25
Heavy melting steel, eastern, Pa.	22.50	23.60	23.75	16.15
Heavy melting steel, Chicago	22.00	23.15	25.05	16.75
No. 1 wrought, eastern Pennsylvania	33.50	34.00	36.15	22.50
No. 1 wrought, Chicago	28.00	29.50	30.75	18.70
Rerolling rails, Chicago	31.50	31.50	34.65	19.25

•1.75 to 2.25 silicon. ••2.25 to 2.75 silicon.

Coke Factor Affects Iron Market

Item of Fuel Costs Influences Conservative Selling by Many Furnaces—Eastern Makers Quote Advances on High Silicon Iron—Furnaces Forced to Bank —10,000 to 15,000 Tons of Basic Sold at Pittsburgh

Philadelphia, June 1.—High coke prices are causing eastern Pennsylvania furnace to charge higher prices for high silicon foundry iron. Several sales of No. 1X (2.75 to 3.25 silicon) were made the past week at $50 furnace for both prompt and second half delivery and 3.25 to 3.75 silicon iron for prompt shipment brought $55 furnace. The coke scarcity is very acute and the Brooke and Standish furnaces have been banked as a result. The shipping situation is better in spots and worse in others so that some consumers are getting coke more freely and others less freely. The same thing applies to pig iron shipments. The Norfolk & Western railroad is inquiring for nearly 5000 tons of No. 2 plain (1.75 to 2.25 silicon), No. 1X (2.75 to 3.25 silicon) and malleable bessemer. The N. & G. Taylor Co. is inquiring for 5400 tons of third quarter basic but the latter is expected to be placed in Pittsburgh district as usual. Otherwise current inquiries are small and business of the past week has been quiet. Prices of eastern Pennsylvania iron are unchanged ranging from $45 to $47 furnace for No. 2 plain and $46 to $48.25 furnace for No. 2X (2.25 to 2.75 silicon). Only one Virginia furnace now is quoting $44 furnace base and this interest is selling only spot iron at this level. This and other Virginia makers are asking $45 furnace base on last half and others ask the latter figure on prompt also. The Stanley Flagg Mfg. Co. has not yet closed on its malleable and special basic inquiry. No sales are reported in malleable, gray forge and basic. The only sale of low phosphorus reported is 500 tons of .0.045 phosphorus or hematite for export at $46 eastern Pennsylvania furnace. Standard low phosphorus continues at $52 furnace and copper-bearing iron at $47 furnace.

Spot Market Chicago Feature

Chicago, June 1.—While pig iron is dull it is not weak. Prices holding firmly and both producers and consumers apparently have confidence in the future. While comparatively little inquiry for contract iron is current, there is an active demand for spot iron and carloads in transit are sold readily. Melters apparently are in need of some additional iron to fill out their first half melt, while they feel themselves fairly will protected on contracts for last half. The producer in this district is fully sold and is not interested in the present market. Carloads are principally from the South and most are sold on the basis of $42, Birmingham, while on some as high as $43, Birmingham, has been done. Some Virginia iron is offered, the quotation on this being $44, Virginia furnace. Apporently spot iron is easier to buy than future contracts from southern furnaces, as the latter are not much interested at this time in future deliveries. While basic users have not been active in the market they are operating at high speed and it is believed heavy demand from this source will come out before long. Silveries are dull with Jackson county furnaces quoting $57, furnace, for 8 per cent while a Tennessee stack is quoting $55, furnace, for the same grade. In some cases consumers have asked anticipation of contract shipments. Low phosphorus iron is being quoted at $55, Ohio furnace, but it is understood that some recent sales have been made at $54.

Shipments Are Increasing

Boston, May 31.—The transportation situation has improved during the past week, and foundrymen, instead of rushing in to make spot purchases, have felt enough confidence in continued shipments to await deliveries on orders already placed. Most consumers of pig iron are well covered by contracts, but have made spot purchases to keep plants in operation. The market has been decidedly quiet in the past week. Favorable shipping conditions have led to a renewal of interest in southern iron. No. 2X (2.25 to 2.75 silicon) can be purchased on docks at Boston at $49. This is equal to the delivered price of the same grade of iron from any other furnace district to points within trucking distance of Boston. For interior points the situation is not as favorable for the southern irons. Virginia prices are firm and little iron from that district is available in New England at less than $45, base. An order for 300 tons offered at $44 was refused by one furnace. This order which was for 2.75 to 3.25 silicon iron was later placed with a Buffalo furnace at $49, furnace, or $52.90, delivered. The Virginia Iron, Coal & Coke Co., Roanoke, Va., is offering some special iron at $44, base. Prices in eastern Pennsylvania are $46 and $47 for 1.75 to 2.25 silicon. Sales during the week from that district have been in carlcad lots only. A western Pennsylvania interest has offered a limited tonnage of iron at a base price of $44.50, furnace. Last half business has been limited to few orders. One lot of 250 tons of 2X iron from a Buffalo furnace sold to a central Massachusetts consumer at $46.25, furnace, or $50.15, delivered.

Conditions at the furnaces are reported as more favorable, with several new stacks blown in.

Demand Grows Larger

New York, May 31.—A material improvement in demand has characterized the pig iron market in this district the past few days and sales which actually have been made, together with inquiries which are on the point of being closed, aggregate a large total. Numerous large tonnages, making a total of more than 10,000 tons of foundry iron, have been sold, and there are inquiries out for 20,000 to 25,000 tons. Included in the sales were one or two large tonnages for prompt shipment, considerable for second half and a sizable portion for prompt export. Current inquiries include one for 4000 tons, one for 1300 tons, one for 2500 tons, one for 4800 tons, all for domestic consumers, and there are numerous other inquiries for good-sized tonnages. A number of large blocks are expected to be closed shortly for export, if the iron is obtainable. The supply of iron constantly is growing less for the remainder of the year. Four Alabama and Tennessee furnaces, which right along have been taking on some export business, advised their representatives this week that they are unable to accept any more tonnage. As a result, orders for several thousand tons of export business again have had to be turned away this week, despite the fact that credits to pay for the iron upon shipment already had been established at New York banks.

Eastern Pennsylvania furnaces now are selling less freely, and this also is true of Virginia makers, although one Virginia furnace, which is expected to go into blast shortly, has not yet opened up its order book. Considerable central Pennsylvania foundry is being sold for May-June shipment, and there also have been some sales of central Pennsylvania iron for second half. While there is a firmer tendency in some directions, due to the sold-up condition of individual furnaces, the general price situation is unchanged. Eastern Pennsylvania foundry continues to be sold at prices ranging from $45 to $47, furnace, for 1.75 to 2.25 silicon, and $46 to $48.25, furnace, for 2.25 to 2.75 silicon. Sales of a number of tonnages have been made during the past few days on the $47 basis. All Virginia furnaces are asking $45, furnace, base, for iron to be shipped in the future, and the only Virginia iron which is obtainable at $44, base, apparently is for spot shipment. The market on central Pennsylvania foundry is about $45, furnace, base, although a little tonnage has been sold at slightly less than this figure, and considerable has been sold at higher. No sales of New York state iron have been made in this district during the past week as far as known.

Recent export sales include 750 tons of 0.06 per cent phosphorus, or hematite, to Belgium, and 1000 tons of off-grade low phosphorus, to Italy, all of this business having been taken around $45, furnace. Practically all of the makers of low phosphorus iron now are charging regular differentials for silicon. The inquiry for 5500 tons of low phosphorus iron for a Worcester consumer still is pending.

The Norfolk & Western railroad is in the market for 3100 tons of foundry iron, 1700 tons of malleable bessemer and a large block of car wheel iron. Stanley G. Flagg & Co., Pottstown, Pa., have not yet closed their inquiry for malleable and special basic.

Spot Basic is Sold

Pittsburgh, June 1.—Demands for pig iron in this market have been mainly for spot tonnages and with the exception possibly of basic, sales have been small, both individual and in the aggregate. More activity has appeared in basic iron than in the other grades, one merchant producer reporting sales in the past week or so of approximately 10,000 tons, while sales by others bring the total up to close to 15,000 tons. The most recent sale was one of 3000 tons, but was for shipment outside the Pittsburgh district and went at $43.50, valley furnace basis. An Allegheny valley sheetmaker recently closed on a few thousand tons of basic for prompt delivery at $43, furnace. The market on this grade, therefore, is quotable at from $43 to $43.50, valley furnace. The N. & G. Taylor Co., Cumberland, Md., is in the market for 4500 tons of basic for third quarter delivery. Quite a few inquiries have been noted for bessemer iron from melters who ordinarily used basic iron. The former in round lot tonnages is from 50 cents to $1 a ton below basic and where the bessemer runs fairly low in silicon, it can be substituted quite easily for basic. An Ashland, Ky., interest wants 2500 tons. Small lot tonnages of bessemer have been sold at $42, valley furnace, and lots of 1000 tons or more have not gone higher than $42.50. A sale of 3000 tons at $42.50, valley, is reported. Business in foundry iron has been entirely in small tonnages for prompt delivery. General conditions in pig iron operations have not been greatly changed since a week ago. Due to difficulties in securing sufficient coke the Shenango Furnace Co. again has been obliged to bank its No. 3 stack which recently was in blast. Movement of iron from blast furnaces remains extremely uneven, some makers being unable to ship a greater part of their production while others, on account of embargoes and other restrictions affecting prompt shipment, are unable to move more than a small portion of the tonnage. The average prices of basic and bessemer iron from valley furnaces in May as compiled by W. T. Snyder & Co., show that bessemer sales were at an average price of $42.603 and basic at $42.485, compared with $42.317 and $42.815, respectively in April.

Few Sales at Buffalo

Buffalo, June 1.—Total sales of pig iron during the past week, it is estimated, did not exceed 500 to 1000 tons. Inquiry has been checked because furnaces are unable to guarantee delivery, and furnaces are extremely cautious about taking on extra tonnage in view of the production that must be made up on account of strikes during the past six months. Operations are being held down in some plants through lack of fuel, though all furnaces have been able to continue operating. Such inquiry as is coming in is not even being listed by furnaces. One furnace reports having received two or three inquiries for foundry totaling 5000 tons, but no part of this tonnage was accepted. Iron is being piled by every furnace. The car situation is reported somewhat better since the car service committee has taken over the direction of traffic, but the service still is far from satisfactory.

Shipping Current Output

Cleveland, June 1.—Shipping conditions affecting pig iron in this district and vicinity are not appreciably changed. Most producers are shipping about as much tonnage as they are making, and in one or two cases have been moving some iron which recently has accumulated on their banks. However, while shipments in proportion to production make a more satisfactory showing, the latter has been slowed down considerably and the tonnage sent forth consequently is below normal. One large producing interest, as an example, in May shipped 90 to 95 per cent of its production but the latter was only about 70 per cent of normal, its furnaces having been slowed down to this extent. Little new business is being put through. There is some inquiry but makers are not encouraging the placing of any except scattered orders. One seller disposed of 3000 tons of foundry and malleable mostly for last half, during the week at $44, base. Cleveland furnaces have been selling some small lots of prompt iron up to 200 tons at $45, furnace base, and are quoting $44, base, for last half. A sale of 4000 tons of basic for last half at a price to be fixed at time of delivery was closed in this territory in the week. A southern Ohio steelmaker is in the market for 10,000 tons of basic for reasonably prompt shipment. The Fannie furnace at West Middlesex has gone out for relining. The United Alloy Steel Corp. at Canton is running 12 open-hearth furnaces this week against 10 last week.

Market Quiet but Firm

Cincinnati, May 31.—The pig iron market in this district during the past week has been dragging, there having been but little or no buying and the demand for all grades appears to have dropped off materially. It is said that some Ohio valley interests who have been in the market for considerable tonnage of Southern No. 2 have withdrawn and declare that they will not be buyers until late in the year. This is taken generally as an indication that these consumers anticipate lower prices, but there is nothing at this time to indicate that the market will sag. On the other hand even with the absence of any urgent buying demand, prices rule strong and sellers are holding firm for recent quoted figures. Some of the latter express the belief that higher prices generally will prevail before the last half year is very old. An Indiana consumer is said to have placed an order for a moderate lot of Southern No. 2 (1.75 to 2.25 silicon) at $47.10 Cincinnati for October delivery, and an Ironton furnace has sold 5000 tons of No. 2 Northern foundry at $44 furnace to be deliv-

ered at an early date. There has been some resumption of operations among Cincinnati tool and machine shops. Striking employes are said to be returning daily.

Sales Lightest in Years

St. Louis, May 29.—Pig iron business, as represented by actual sales, the past week has been lightest in a number of years. The market besides being dead has developed symptoms of softness. Consumers are not purchasing and to all outward signs are well supplied with iron, on hand or under contract, to carry them for some time. There have been some reductions in asking prices. Conditions of congestion caused by the switchmen's strike, coupled with a change in aspect of general conditions and a rigidly tightening credit market, are causing some discouragement, with both buyers and sellers. One producer who has held his price at $44 for No. 2 Southern (1.75 to 2.25 silicon) now will accept $42. Another important Birmingham furnace interest is advertising a large quantity of the same grade at $41, and it is known that $40, with assurance of prompt settlement, would bring forth material. Sales have been confined to a few small lots, scattered here and there. The largest transaction heard of in the week was 300 tons to a Denver melter. Slightly more flexibility is noted in the local terminal facilities, but the trunk lines are still sadly tied up. The Illinois Central lines to the south are in particularly congested state. Coke continues a crying need with melters, and daily reports of additional western foundries closing down are being received here.

Southern Buying Holds Up

Birmingham, Ala., June 1.—Southern pig iron producers continue to take on some business, though it remains largely in small lots. Reiteration is given to the statement that current sales exceed the make and stocks on furnace banks continue to dwindle. But two or three companies are actively in the market for last half and immediate delivery or spot pig iron is out of the question, even at a $1 advance. Quotations are strong around $42 for No. 2 foundry (1.75 to 2.25 silicon). Nothing more is said of the Tennessee Coal, Iron & Railroad Co.'s price of $38, as there is no iron now to be offered by that company. Foreign business is more active in this district, various sales having been made at $42, Birmingham, including some tonnage for Germany. Sweden is inquiring for 1000 tons of charcoal iron, for delivery during the last half. Sales for domestic delivery during the past week were in amounts mainly around 300 to 500 tons. The extreme East was seeking practically spot iron. Southern consumers continue buying in small lots, ranging from one to five cars. Labor is a little unsettled at ore mines and blast furnaces but production is not being interfered with. As far as can be ascertained pig iron shipments are practically up to promises though some consumers are expressing a willingness to accept deliveries in some instances because they are shut off from other districts.

Coke Shipments Increase

Freer Movement Believed to Indicate Peak of Prices Has Been Reached—Improvement Noted in Connellsville Region

Pittsburgh, June 1.—While the bulk of spot sales of beehive oven coke recently has been at $14 to $15, ovens, for either furnace or foundry grade, and the market still is firm at those levels, improvement in the railroad transportation situation gives rise to expectations of easier conditions in the near future. Not only are the railroads serving the regions giving better service in the movement of loaded cars, but they are placing more cars than they did recently. The most notable recent development in this direction was the allotment of a large number of cars by the Pittsburgh & Lake Erie railroad to the Monongahela railroad. The latter is operated jointly by the Pennsylvania and Pittsburgh & Lake Erie railroads and is supposed to draw an equal number of cars from both roads. This development should help both production and shipments from an important section of the regions which has suffered seriously by the inability of the Pittsburgh & Lake Erie to function normally in the past six weeks. Strong efforts are being made by the larger producers to catch up with their contracts and this is helping out the supply position of blast furnace interests materially. Huge piles of stocked coke are available at a number of the hand-drawn ovens in the regions when cars can be obtained. Some attempts are being made to open negotiations for last half tonnages, but thus far nothing has developed in the direction of actual business. Some producers are talking a 4-to-1 basis for furnace coke on valley basic pig iron, but on the present basis of the latter, this would mean almost $13.25, ovens, for coke which is well above what blast furnace men feel they can afford, with a freight increase impending and the possibility that higher iron prices may not be readily obtained. Production of coke in the Connellsville regions for the week ended May 22, is estimated by *The Connellsville Courier* at 178,250 tons, as compared with 154,400 tons in the previous week.

Foundry Sells at $16

Philadelphia, June 1.—Considerable spot foundry coke is being sold in this territory at $16, Connellsville ovens. No sales of furnace coke are reported however.

Shipments Further Behind

Boston, May 31.—Increased difficulty in obtaining coal has caused the New England Coal & Coke Co. to again curtail its coke production, and as a result shipments to foundries have fallen further behind. Spot coke is not available. The Massachusetts interest is taking orders only for delivery two or three weeks hence. On such orders no quotation is made, the price being determined at time of delivery. Normally the market at present is $17.40, delivered to New England consumers within the $2.40 freight rate from ovens at Everett, Mass. Beyond this zone a $15, oven, price prevails, plus freight to destination. The Everett Co. reports almost no surplus coal on hand and it is this fact together with the necessity for entering the spot market which it gives as reason for the advance in price.

More Freely Obtainable

New York, May 29.—Beehive foundry coke is more freely obtainable for spot shipment, so that a larger tonnage has been disposed of during the past few days than has been usual of late. This has gone at high prices, ranging from $16 to $16.50, Connellsville. Offerings of spot furnace coke still are scarce. This grade has been offered at $15.50, Connellsville, but no sales yet are reported. Considerable New England by-product foundry coke has been sold in this district for spot shipment at $15.50, ovens, and some of this fuel also has been sold for second half delivery into this district at $15, ovens.

Shortage Is More Acute

St. Louis, May 29.—The past week or 10 days has brought little relief to the coke situation. The pinch is tightening right along, and in this district proper it is more and more difficult to keep operating, while to the West there are wholesale closing downs of foundries, furnaces, machine shops and other plants. Complaints against railroad efficiency are multiplying. High prices have been paid for single cars of metallurgical coke by melters with urgent needs.

Upward Tendency Continues

Cincinnati, May 31.—Coke prices show an upward tendency because of a decided scant supply and an increasing demand. A number of foundries in this district which have practically been out of operation for periods ranging from a fortnight to several weeks are getting back into work and these are in the market for fuel in considerable quantities. Not all the orders that are coming into the market are being filled. Though higher prices seem generally to be anticipated they have not appeared as yet. Transportation facilities between the ovens and this district have not improved to the extent expected and the supply is not as satisfactory as hoped.

Production in South Increasing

Birmingham, Ala., June 1.—The starting up of the remaining 60 ovens of the by-product coke plant of the Sloss-Sheffield Steel & Iron Co., at North Birmingham, making 120 ovens in operation, has added to the production of coke in Alabama. The Sloss-Sheffield company's daily production will be around 1500 tons. A strike at the mines of the Yolande Coal & Coke Co. has not as yet interfered with the coke output.

New Bar Inquiry Is Good

Independent Sellers have Considerable Tonnage to Select From—
—Some Sales still up to 4.00c—1921 Contracts at 2.35c

Chicago, June 1.—Inability to buy soft steel bars for delivery this year continues to trouble consumers who are not covered and independent makers who are able to take some tonnage of this material have plenty of inquiry from which to choose. The leading interest is booking some bar tonnage for indefinite delivery, which undoubtedly means 1921, at 2.62c, Chicago, and this has had the effect of easing demand somewhat. Eastern independents continue to take tonnages at 4.00c, Pittsburgh, while some others have shaded this to 3.75c, Pittsburgh.

Railroads are buying a little more freely of bar iron, recent tonnages of 500 to 800 tons having been closed. The preponderance of small sections has loaded mills up heavily with this class, and some makers are now refusing to take further tonnage except in a few cases from regular customers in great need. On this business 4.00c, Chicago mill, is being quoted, while on larger sections 3.75c, Chicago mill, can be done.

Inquiry for hard steel bars is somewhat less, although it is still greater than mills can accommodate. One reason for this decrease is that implement manufacturers are unable to obtain steel and castings for their full construction programs, and have been forced to cut down their production and thus need fewer hard bars. The quotation continues firm at 3.75c, Chicago mill.

Buyers Less Insistent

Pittsburgh, June 1.—While a large unsatisfied demand still exists for merchant steel bars, it must be said that buyers are not nearly so insistent for tonnages as they were a short time ago because they fully realize the difficulties with regard to shipment still confronting makers and realize that premium figures could not guarantee delivery. Moreover the virtual disappearance of the prompt market finds reflection in a narrower range of prices with leading independent makers here and in the valley district generally quoting 3.00c to 3.25c, but one independent maker still is quoting 4.00c base and claims to have made some recent sales at as high as 4.50c. Makers are holding to 4.50c base for common bars.

Two Mills Out of Market

Buffalo, June 1.—There is strong and insistent demand, but very little tonnage is being accepted. At least two mills are definitely out of the market. Prices range from the price of the leading interest of 2.45c to 3.25c and 4.00c.

Prompt Tonnages Less Urgent

Pittsburgh, June 1.—While base prices of cold finished steel bars still range anywhere from 4.10c to 6.50c, less business is being done at the higher figure than recently. Business placed at that price represented spot tonnages which could be shipped promptly, and such demands have tapered off materially.

Still Sell at 4.00c

Philadelphia, June 1.—Steel bar inquiry due to the holiday is less active. The freight situation at Detroit, Youngstown and elsewhere is better so deliveries has improved but makers say they still are able to book all steel bars they want at 4.00c, Pittsburgh, for delivery in 60 to 90 days. Current prices of independent makers range from 3.45c to 4.00c, Pittsburgh, for shipment at mills convenience. One mill which has been selling cold-rolled steel at 6.50c, Pittsburgh, has withdrawn. A big demand for spring steel is current and considerable business was taken the past week at 4.50c. One current inquiry calls for 2000 to 3000 tons for third quarter.

Bolt Makers Hold Prices

Chicago, June 1.—In the face of restricted production because of lack of raw material, manufacturers of bolts and nuts have no difficulty in maintaining the higher schedule announced last week of 10 per cent over the former list and are forced to turn down much offered business.

Prompt Demands Fewer

Pittsburgh, June 1.—While makers of hoops and bands in this district have exceptionally heavy bookings, buyers generally are short of supplies and prompt demands are on a considerably less extensive scale than they were recently. This condition probably finds explanation in the fact that buyers are well protected against future requirements and realize the futility of trying to secure early shipment even at high prices with the transportation situation in bad shape.

Conditions Somewhat Easier

Pittsburgh, June 1.—Prices and discounts on nuts, bolts and rivets are unchanged in this market. Improvement in railroad operation has rendered the position of makers somewhat easier, as more finished material is moving and receipts of bars and rods are a little larger. Demand has lost some of its recent snap as buyers generally are covered against their requirements over the last few months and curtailment of the movement of plain material to the fabricating interests has reduced the use of rivets. Specifications against bolt orders are not as heavy as they have been. This is especially true with automobile builders whose production schedules are affected by the light shipment of steel the past month or so.

Marked Decrease

Shown in Demand for Structural Material—New York Pier Bids Opened

Chicago, June 1.—Marked decrease in demand for structural material is noted by all interests in the construction field and some engineers have practically nothing on their books for prospective business. Present difficulties in obtaining material, high cost of material and labor and difficulty in financing construction for which money must be borrowed, are at the bottom of this condition. Prices remain unchanged with the leading interest quoting 2.72c, Chicago mill, and independent makers a somewhat higher schedule. However, premiums on the part of some independents are being shaded somewhat.

Fair Tonnage Awarded

New York, June 1.—New structural awards include a fair tonnage, and indicate some improvement in the general situation in this district. Among the awards is one of 4000 tons for an office building on Fifty-seventh street, taken by the Hay Foundry & Iron Works. The low bidders on the six Staten Island piers requiring 17,000 tons of steel are Post & McCard on the two largest, Snare & Triest on the two intermediate structures and the McHarg-Barton Co. on the two smaller. The third shape mill of the Pencoyd, Pa., works of the American Bridge Co., is likely to close this week, owing to a shortage of pig iron.

Mills Report Larger Bookings

Philadelphia, June 1.—Some shape mills report larger bookings in the past week, but this condition is not general and the market as a whole continues quiet. Eastern mills are quoting 3.50c to 4.00c, Pittsburgh, while Pittsburgh mills name as low as 3.25c, although not anxious for business. Considerable of the past week's business went at 4.00c. Eastern shape mills have reached a point where some of them would be glad to take on attractive tonnages around 3.50c.

Structural Business Is Slack

Pittsburgh, June 1.—Only a few lettings, and these of small tonnages, have been placed with fabricating interests here lately. While improvement in the railroad situation is resulting in a better movement of plain material from the mills, the uncertainty of deliveries still exists and investors also are inclined to defer building because of the money stringency. Figures of the Bridge Builders and Structural society for the week ended May 22 show inquiries for that week of less than the theoretical independent fabricating capacity, which is about 15,000 tons, while lettings were only about 10,000 tons. The market continues to recede from the recent maximums on plain material, the result of lighter and fewer demands. While the quotation of one independent company is 4.00c on plates, shapes and bars, it is believed this company would consider 3.75c on shapes. Prices of other independents are 3.00c, 3.25c on bars, 3.10c to 3.35c on shapes and 3.50c on plates.

CONTRACTS AWARDED

Building for Durand Steel Locker Co., Chicago Heights, Ill., 156 tons, to American Bridge Co.

Hot-metal bridge for Trumbull Steel Co., Warren, O., 450 tons; to American Bridge Co.

Mill building for Tubize Artificial Silk Co., Hopewell, Va., 800 tons, to Virginia Bridge Co.

Office building on Fifty-seventh street, New York, 4000 tons; to Hay Foundry & Iron Works.

Addition to plant of General Electric Co., Fort

Wayne, Ind., 200 tons; to American Bridge Co.

CONTRACTS PENDING

Office building for state of Pennsylvania, Harrisburg, 3000 tons; bids being taken.

Hangar in Texas for army air service, 800 tons; bids being taken.

Movie theater, Chicago, 400 tons, bids being taken.

Better Output

In Sheets but Car Supply Short—Mahoning Valley More Active

Pittsburgh, June 1.—A freer movement of sheet bars to the sheet mills and of finished material away from the mills have led to heavier plant operations. The American Sheet & Tin Plate Co. has been able to increase operations at some of its mills in the Shenango valley which were seriously affected by the railroad situation, and now has all but a few of its sheet mills in operation. Independent sheet capacity also has increased, being fully 75 per cent engaged as compared with only 70 per cent a week or 10 days ago. Conditions with Mahoning valley sheet makers have registered notable improvement. Cutting down of obligations is not especially rapid because much of the improvement recently scored is represented in the movement of loaded cars and few mills have been having many empty cars placed. The car shortage is a serious obstacle to the immediate restoration of normal conditions. A number of prompt tonnages still are commanding fancy prices, black sheets having recently done as high as 7.50c and galvanized sheets 8.50c on small tonnages which could be shipped. Money market conditions appear to be interfering somewhat with the activities of the automobile industry and to be reducing the demand for early tonnages of sheets from this source. There is increased talk of an independent market on black sheets ranging from 5.00c to 6.00c, base.

Wide Range in East

Philadelphia, June 1.—Blue annealed sheets continue to be booked by eastern mills at 5.50c and 6.50c, Pittsburgh. The mill quoting the former price, however, is about out of the market, having sold into the fourth quarter. Black sheets for fourth quarter are being booked at 7.00c and one-pass sold-rolled at 8.00c. Sheet demand generally continues brisk.

Consumers Want Deliveries

Youngstown, O., June 1.—The sheet market continues to be characterized by an active demand for deliveries and by a lack of cars for making shipments. Producers agree, however, that while they expect business to continue good and prices firm for the rest of the year, conditions in the market have changed considerably in recent weeks. Offices are not being crowded with buyers from all parts of the country offering large premiums as they were a few weeks ago. One sales manager reports that complaints against existing prices are beginning to appear from quarters, where premiums formerly were freely offered. Some cancellations of sheet orders, largely from automobile companies, are reported. Jobbers continue as important factors in the sheet market.

Plate Orders Increase

Pennsylvania Railroad Inquires For 15,000 Tons—30,000 Tons of Shipping Board Steel Goes Abroad—Car Plates Placed

Philadelphia, June 1.—Plate demand is improved in the eastern district. The principal inquiry is from the Pennsylvania railroad which has specifications out for 15,000 tons and has more tonnage in prospect. Mostly thinner gages are involved. The Reading railroad wants several hundred tons. Other current inquiries are small. Actual orders the past week were larger than in any similar period of the past five or six weeks. They included some locomotive plates, some boat repair plates, etc. Export orders are large, including one lot of 5000 tons of boat plates for a Scandinavian country at 4.00c Pittsburgh, one lot of 3000 tons of boat plates for England at slightly less than 4.00c Pittsburgh. Recent export plate business includes 30,000 tons of ship steel originally bought by the shipping board and resold for export at 3.65c to 4.00c Pittsburgh. There is a big export inquiry but the mills show less inclination to take it owing to the difficulty of shipping. New York has been embargoed for long time and today both the Pennsylvania and the Reading embargoed all export shipments by way of Philadelphia due to the longshoremen's strike here. Baltimore still is open but the latter is inadequate to satisfy all demands. Eastern mills are quoting from 3.75c to 4.00c Pittsburgh but plates can be had from Pittsburgh mills around 3.50c.

Business is Moderate

Pittsburgh, June 1.—New business in plates in this district is of moderate proportions, although a number of export inquiries are filtering in, notably from Holland, and on such tonnages as are being placed the advantage on prices is more with buyers than it has been. The 4.00c base price practically has disappeared as far as business in this district is concerned, although some of the independents continue to name that price against inquiries. Possibly 3.75c might be done on small tonnages which could be shipped out immediately, but buyers whose requirements are of urgent character no longer are numerous and in a broad way, 3.50c may be considered the maximum independent figure based on sales. Meanwhile, the Carnegie Steel Co. continues to quote 2.65c, and while not taking much new business at that figure is making somewhat heavier shipments against orders at that price.

Export Prices Soften

New York, May 29.—The top of the market on ship and tank plates for export now appears to be 3.75c, Pittsburgh. Exporters show no interest in quotations which are higher than this figure, while a number of sales have been made at 3.75c. There is a fair amount of export inquiry before the trade, particularly for Great Britain, France and Italy. Current domestic demand in this district, however, is light. Some further business in locomotive plates has been transacted.

Some Plates for Cars

Chicago, June 1.—Demand for steel plates is somewhat less than it has been, but with mills practically sold for the remainder of this year the lack of interest is not a detriment. Some tonnages for car builders are in prospect but closing of these tonnages is slow. Present high cost of railroad equipment is holding back much buying of needed rolling stock. About 12,000 tons of steel, largely plates, will be required for 2000 box cars now being inquired for by the Big Four railroad.

Will Accept Business

Buffalo, June 1.—While not actively seeking business one mill here announces that it will accept plate business for delivery three months hence.

Pipe Demand

Upon Mills Keeps Up Well—Municipal Buying of Cast Light

Pittsburgh, June 1.—Demand for tubular goods shows no relaxation but possibly is a little less insistent than it has been because buyers realize that manufacturers cannot perform the impossible. Railroad operations are better and shipments are improving but only one important maker is getting better than an even break on production and shipment but most of the maunfacturers still are piling the bulk of their output. A scarcity of cars now is the problem to all makers and definite improvement in this direction is expected for the next few weeks. Operating conditions, in the Youngstown disfrict, of pipe manufacturers are better, and the National Tube Co .and the Jones & Laughlin Steel Co. still report full plant operations. It is reported that a southern Ohio brokerage interest which some time ago secured about 2 miles of 6-inch line pipe, has not been able to dispose of it at 1.52c per foot, the original price, and now is offering it at 1.38c per foot.

Shipments Are Better

New York, May 31.—Demand for cast iron pipe in the East is featureless. No municipal inquiries of consequence are current and private buying remains steady. The situation at the shops generally is said to be easier with regard to the movement of shipments but scarcity of pig iron is still causing considerable difficulty.

Better Business in Sight

Chicago, June 1.—Although the inquiry of Akron, O., for 1800 tons of large cast iron pipe, on which bids are to be opened June 1, is practically the only business in prospect in the West, a number of other inquiries on the part of cities are expected soon.

Scrap Market Still Quiet

Prices Show More Weakness as Consumers Continue to Postpone Purchases—Shipments on Contracts Improving—Trading in New England

FOR COMPLETE SCRAP PRICES SEE PAGE 1648

Chicago, June 1.—Consumers of iron and steel scrap are taking comparatively little tonnage and dealers are marking time except that present lower prices are bringing about some buying by dealers to apply on existing contracts. Most of this business is between dealers, although some material is being taken from consumers, who seen anxious to sell, probably with the idea that the present decline is likely to continue. Quotations continue to go down and losses of 50 cents to $1.50 are being registered on various grades from week to week, practically nothing being able to resist this tendency. Railroads are not offering much tonnage, a list by the Pennsylvania railroad covering 1000 tons being practically the only thing now before the trade.

New England Market Improves

Boston, May 31.—The decline in the scrap iron and steel market has been halted, at least temporarily. A healthy consuming demand at prevailing prices has developed. Heavy melting steel especially is in greater demand for steel consumers. Several fairly large orders have been reported at close to $20. One interest made a shipment of nearly 1000 tons to the Pennsylvania market, although the Pennsylvania consuming market has not strengthened as the New England demand would indicate. This probably is due to the shipping situation. For some time the spread between Pennsylvania and New England prices has been considerably in excess of the freight rate between the two points and now with better prospects of getting deliveries dealers have been free to take advantage. Cast grades continued on the even price level of the past few weeks, but the demand from foundries shows signs of improvement. Dealers feel that the low ebb has been reached and that a turn in the market may be looked for.

Dullness is Pronounced

New York, May 31.—Dullness in the local scrap market ha sbeen further accentuated by the holidays, many offices closing Friday night for a period of three days. There has been a fair demand for mixed borings and turnings, but for other than that inquiry has been exceedingly quiet for the past week. The market as a whole is unchanged, although there has been some nominal reductions. No. 1 heavy melting steel is now holding at $18.50 to $19, f.o.b. New York, and cast iron car wheels, $36 to $37. Stove plate and railroad wrought are also somewhat lower, holding at $26 to $27 and $29 to $30, respectively. Rejections, noted last week as heavy, are less numerous.

Railroad Lists Show Repairs

Philadelphia, June 1.—Scrap business in Philadelphia and vicinity continues largely of transactions between dealers. Consumers generally show no interest except in cast scrap for which there is a good demand. Rolling and steel mills are not buying. Railroad lists for June are of fair size. The Pennsylvania list reflects the increasing extent to which that road is making car and locomotive and other repairs. Most of the railroad scrap since the war has continued to go direct to consumers instead of to dealers as before the war.

Loaded Cars Moving

Pittsburgh, June 1.—Conditions in the scrap iron and steel market are improved at least to the extent that the congestion of loaded cars in railroad yards and on sidings have been appreciably reduced. Shipments by direct line, however, are practically nominal, and assurance is given by the railroads that permits for shipments from one road to another will be issued soon. While it cannot be said that this development has been accompanied by much new buying, it is believed that the one big obstacle to business, the railroad freight tieup, has been removed, and that new demands are not far off. This expectation finds reflection among dealers in a firmer stand on prices. Small sales of heavy melting steel continue to be made to one Pittsburgh district steelmaker at $25.75, and somewhat in excess of $26 has been obtained on this grade to a large steel foundry. The market remains slack on turnings for both open hearth and blast furnace use and bundled sheet sides and ends are extremely slow of sale. Heavy breakable cast for steel works use, however, is decidedly scarce and a tonnage recently was sold for this purpose at $33.50, or about $1.50 above the previous sales price. The supply of cast scrap is light and prices are firm. Some tonnages of stove plate recently have been sold here for shipment east at well above local prices, and the market in iron axles is strengthened not only by light supplies, but an excellent export demand.

Market is Steadier

Cleveland, June 1.—The iron and steel scrap market here is far from active, even the occasional trading among dealers having disappeared. The market weakness has resulted in some price revisions downward, but these new levels are holding steadily with some dealers believing the market the low point for old material. Consumers are well supplied and offerings on the market generally are ignored.

Heavy Melting Off $1

Buffalo, June 1.—The scrap market continues dull, although dealers are expectant of good business when deliveries can be made. An occasional carload of material is getting through to destination, as embargoes have been lifted on some important shipping points. Heavy melting steel is off $1, and is now quoted at $24 to $25. One mill here continues taking on available tonnages at $24.50, but has not succeeded in obtaining heavy tonnages. There is a strong underlying interest in the market, and reports received by dealers indicate that stockpiles are steadily diminishing without the ordinary replenishment.

Cincinnati Conditions Inactive

Cincinnati, May 31.—The scrap market continues inactive, there having been but little buying by the big consumers for several weeks. On the other hand, yard supplies have not materially increased and there is only a reasonable accumulation on hand. Shipping conditions have been almost intolerable for the scrap dealer. There have been some recent embargoes which effected him directly and the car shortage has been a big barrier to business. Price schedules have not been changed.

St. Louis Conditions Dull

St. Louis, May 29.—Trading in scrap iron and steel continues in an apathetic state. Consumers are showing little interest, and dealers think general conditions are too uncertain to deal speculatively among themselves. New offerings before the market are almost nothing, the small tonnages changing hands being material previously acquired by yards or dealers. The railroads are offering nothing for sale, not a single list from that source being before the market during the week. Purchasing agents say they will not attempt to market much scrap until the existing congestion is abated somewhat and until the supply of freight cars becomes a bit more plentiful. Rerolling rails were lower, being cut from $31 to $31.50 to $30 to $30.50, and machine shop turnings were off $1.50. Many quotations are nominal.

Southern Market Quiet

Birmingham, Ala., June 1.—Except for a little cast scrap, there is not much demand in the South. Dealers still have considerable tonnage to ship on contracts. Consumers of heavy melting steel are postponing purchases. Despite the quiet conditions prevailing in the market prices are firm. It is believed that there will be but little life in the scrap market during June and July.

Little Help

Yet Extended to Canners But Tin Plate Movement Is Better

Pittsburgh, June 1.—While improvement in the operation of the railroads has resulted in the movement of many cars of tin plate, some of the railroads have been unable to provide empties at the tin plate mills with the result that the accumulation of finished material has not been materially reduced, and the position of the makers of perishable food containers remains extremely precarious. It is believed that the interstate commerce commission is

impressed with the necessity of providing cars for the movement of tin plate to the can manufacturers, but apparently is unable to do so, on account of the shortage of box cars. Tin plate mills are not having much difficulty now in securing fairly good supplies of steel and fuel, but plant congestions are so heavy as to prevent any material increase in mill operations. The latter still remain somewhat below 50 per cent of capacity. Marketwise, conditions are extremely tight, as the railroad conditions have only served to back up orders. If deliveries could be made no trouble whatever would be experienced in obtaining substantial premiums over the regular base price of $7.00, Pittsburgh, from domestic sources. A large and waiting foreign demand is here at prices not less than $11.00 per base box.

Wire Production

Still Exceeds Shipments, Although More Carloads Are Moving

Pittsburgh, June 1.—While all of the manufacturers of wire and wire products in this district report larger shipments as a result of the improvement in railroad operation, it may be said safely that production has continued well in excess of the outward movement of finished material. In a broad way, the mills have been able to move only the loaded cars lying within the plant yards and have not appreciably reduced warehouse stocks, for the railroads now are running short of cars, especially box cars, which are most desirable. Any new production that is moving is entirely in motor trucks. Some makers can take on business in wire fence, but as a rule the manufacturers are sold ahead on wire products for as much as five months and are declining new business until they have been able to reduce old obligations. Leading independents still are quoting plain wire at $3.50, base, and nails at $4 base, and these prices readily would be paid if makers would accept business.

Chicago Conditions Better

Chicago, June 1.—Although railroad car supply to wire and nail mills is still far from sufficient to meet requirements, it is so much better than has been the case over recent weeks that shippers are in a greatly improved position. At present on the average mills are able to ship as much material as they produce, with an occasional opportunity to move some accumulated stock. Production is being increased steadily and at present is at a reasonable level. No selling is being done except on replacement orders.

Buys Machine Plant

The plant of the Batavia Steel Products Co., Batavia, N. Y., with floor space of 500,000 square feet has been acquired by the Gray Machine Tool Co., Inc., Buffalo, which has increased its capitalization to $300,000. Thread millers and piston machinery will be manufactured. Machinery will be installed June 15.

Semifinished Is Easier

Prompt Tonnages Are in Less Demand — Open-Hearth Sheet Bars Around $75—Export Billet Sales Are Above Domestic Market

Pittsburgh, June 1.—The past week or 10 days has been marked by a considerable decline in the demand for prompt tonnages of various forms of semifinished steel. Some of the sheet and tin plate manufacturers appear ready to make monthly or quarterly contracts, but those who have any tonnage for sale prefer to move it on a sale rather than on contract. Improvement in railroad operations has brought about a rather better movement of semifinished steel against contracts and probably explains the limited demand of the past week. Finishing mill operations have not expanded materially as yet as considerable accumulations of finished steel products still remain in mill yards and warehouses. Operations of the tin plate mills are still less than 50 per cent of capacity, and it is doubtful if more than 75 per cent of the sheet mills of the country are in operation. The Carnegie Steel Co., has about 80 per cent of its ingot capacity running and the steel works operations of the Jones & Laughlin Steel Co. are fully as high.

Sheet bars still are quotable from $75 to $80, Pittsburgh, for open-hearth steel and $70 to $75 for bessemer, but it is doubtful if either sheet or tin plate manufacturers today would have a great deal of difficulty in securing prompt tonnages at the lower figures. While some makers are asking $75 for 4-inch rerolling billets, that price appears to be somewhat extreme and only occasionally is realized. Quite an active export demand is noted for 2-inch billets, but such business is not getting much attention here because of the difficulties surrounding shipments at present. Brisk demand prevails for wire rods from both domestic and export sources, and independent makers still are making sales on domestic accounts without much trouble at $75, mill, for common rods.

Export Sales Are Made

Philadelphia, June 1.—Considerable variation continues to feature rerolling steel prices. Several thousand tons of rerolling billets were sold for export at $75 to $80, Pittsburgh, but $60 and $65 still is obtainable for domestic use. The minimum for forging billets is still $75, Pittsburgh, and not much inquiry now is current for the latter. Several inquiries for rerolling billets are pending. Sales of a round tonnage of slabs were made for prompt shipment around $62 to $63, Pittsburgh. Two mills which have been selling billets have withdrawn. Several thousand tons of wire rods have been sold for export at $85 to $86, Pittsburgh. One maker now is in the market for bessemer and open-hearth sheet bar orders.

Sheet Bars Seem Easier

Cleveland, June 1.—Sheet bars manifest a slightly easier tone and $75 Youngstown and Pittsburgh now seems to be the current talking price. May settlements on terne plate contracts probably will be made around this figure. However the market is lacking of transactions which would show its true level definitely. A strong demand for billets for export especially of the smaller sizes continues. Makers have been able to realize higher prices on foreign business of this sort than with domestic buyers.

Car Orders

Still in Only Moderate Total—Big Four Buys 2000 Box

Chicago, June 1.—Comparatively little business is being done in car buying in the West and inquiry is also slack. The Big Four railroad is inquiring for 2000 box cars which will require 12,000 tons of steel. The National Railways of Mexico have put out an inquiry for 500 freight cars which will require 2500 tons of steel. The Southern Pacific railroad is inquiring for six motor cars and six trailers. The Standard Oil Co. has placed six gondolas with the Mt. Vernon Car & Mfg. Co. The Chesapeake & Ohio railroad has bought 500 hoppers and the Virginian railroad 1000 hoppers, the latter to have 6-wheel trucks, from the Pressed Steel Car Co. Steel for these cars will be furnished by eastern makers.

Light rails and fastenings are being inquired for in large tonnage, without let-up. Local producers are booking some orders for this class of material. No selling of standard steel rails is being done with the exception of material needed by frog and crossing manufacturers, which are regarded as highly essential.

New Bookings Are Small

Pittsburgh, June 1.—Makers of spikes are getting few inquiries from the railroads at present and orders generally are for small lots. They are well sold ahead, however, and not actively seeking new business. Railroad orders for standard spikes are being taken by independent makers at 4.00c mill. Small spikes hold steady at 4.50c to $5.25c, base, with order books of makers well filled. The market in standard rails is without new feature, but in light sections, prices are not quite as firm as they have been. One maker while still holding to 3.75c, base, would shade this price, it is believed, on the heavier rails of this class. Demands for light rails generally are fewer and smaller than they have been.

The British Empire Steel Corp. recently formed by a merger of Canadian and British steel and shipping interests has been incorporated under the laws of Nova Scotia with a capitalization of $500,000,000.

Shipping Troubles Check Exports

Material Routed Through Philadelphia Is Delayed by Sudden Strike — England and Germany Buy Semifinished Material in Tonnage Lots — Germany also Buying Pig Iron—South American Wire Demand Is Large

NEW YORK, May 31.—While shipments from this port are retarded by harbor conditions aggravated by an extension of the longshoremen's and freight handlers' strike, as well as railroad difficulties, more freight has been moved abroad from southern ports than at any time this year. New York exporters express themselves surprised by increased receipts at this port from producers, but the difficulty at this time is in getting this material handled and arranging for ocean space.

During the past month the export tonnage through this port dwindled perceptibly, and many shipments were diverted to Philadelphia and Baltimore. Late shipments through Baltimore include 2475 tons of steel and 125 of tin plate to England and Scotland. Through Philadelphia was shipped 3788 tons of steel, 417 tons of bar iron, 152 tons of tubes, 72 tons of nails and 23 tons of bolts to England; 269 tons of steel to Scotland; 522 tons of steel to Holland; 97 tons of steel, 138 tons tin plate and 48 tons of pipe to Norway; 570 tons of steel rails and 103 tons of tin plate to France; 367 tons of steel and 27 tons of pipe in Italy; 472 tons of armor plate and 1410 tons of steel rails to Denmark, and 750 tons of spiegeleisen to Germany.

The outstanding feature of the export market during the past week was the partial lifting of the rail embargoes on freight coming to the port of New York. But as the improved deliveries to the port were made possible the freight handlers gave trouble. Some of the shipments diverted to Philadelphia were even caught up in the sympathetic strike started there during the latter part of the week.

This delay is having a serious effect on European prospects. England has been buying ship plates against early delivery. Delays consequently make the price a more deciding factor in the English purchases. German interests have been negotiating with American exporters but if business is to be done special arrangements must be made. Germany has indicated her willingness to buy sheet bars, wire rods and similar semifinished material provided we will purchase back the finished sheets and wire. Germany has no coal with which to produce the semifinished material but an adequate rolling capacity, wherefore the offer. As yet none of these offers have been accepted. A Pennsylvania producer however has sold 5000 tons of foundry iron to Swedish and German interests, the order benig placed with southern operators on a basis of $42 to $44, Birmingham. Additional orders are expected from these countries.

England has also been buying some semifinished material. One house reported that within the past three weeks it has placed English orders for 6000 tons of wire rods and about 20,000 tons of billets and blooms. It was also learned that England has purchased 30,000 tons of ship plates from the surplus tonnage of the shipping board. These plates were sold subject to Lloyd's specifications at a price said to be 2.75c New York.

An order for 17,000 tons of steel for delivery during the first half of 1921 has been placed here by Holland with the United States Steel Products Co. for shipment to the Dutch East Indies. The Netherlands is in the market also for 2000 tons of finished steel products and 30,000 tons of steel rails.

So far as current sales are concerned, it is declared by exporters, Europe and the Near East are absolutely dead. Some railroad business is developing in the Orient, but South American business remains subnormal.

The coming forward of goods purchased on contracts placed many months ago is expected to hasten some price readjustment.

Purchasing is just as spotty as is the production in this country. While the Orient is reported absolutely dead, some deals are still going through. Japan, it was said, last week purchased 12 Pacific locomotives for delivery to Korea. These are to be delivered in the first quarter of 1920. Japan also has purchased for first half delivery two miles of 70-pound rails. The locomotive inquiries from the Orient are reputed to be extremely active.

The South American market is featured with orders for bars, wire and sheets. The wire demands particularly predominate. One house reported the receipt from Argentina of orders for a few thousand tons of wire nails. Brazil has inquired for 10,000 spools of barbed wire. This being autumn in these South American countries the demands for fencing and similar farm repairs is peculiarly alert.

Some of the export houses are still anticipating good railroad business from South America despite the disappointments experienced in this line during the immediate past. Chile, it was pointed out by one exporter, shortly will approach the market for approximately 15,000 tons of rails.

The Nonferrous Metals

	‡Copper	Future Straits N. Y.*	†Lead New York basis	Zinc St. Louis basis	Aluminum	Spot antimony	Nickel ingot
May 26	19.00	49.00	8.50	7.50	33.00	9.175	43.00
May 27	19.00	50.50	8.50	7.50	33.00	9.175	43.00
May 28	19.00	51.50	8.50	7.525	33.00	9.175	43.00
May 31	Holiday						
June 1	19.00	51.25	8.50	7.625	33.00	9.125	43.00

*Future shipment from Singapore or London.
†American Smelting & Refining Co.'s price.
‡Producers, second quarter; July-August 19.25c.

NEW YORK, June 1.—Consumers of nonferrous metals through another week have failed to be stimulated into buying, regardless of price considerations. Straits tin prices dropped to the lowest levels in more than three years, but consumers showed no great interest. Zinc was obtainable at 7.50c, East St. Louis, which price represents a loss to some smelters, but the zinc market was dull. Today, however, a little strength was shown at 7.62½c. Copper, in the outside market, was offered at 18c, refinery, as against the producers' price of 19c, delivered, but no real activity appeared. Lead remained an exception, as regards price strength, but this was due to scarcity of supplies rather than to active demand.

Transportation conditions have improved slightly from day to day, but immense amounts of material still are tied up or in transit and consumers figure on these supplies as a reserve which will enable them to operate for some time after their own shipments have improved. Export demand has remained light in all lines. The Japanese financial panic, recently followed by several bank suspensions, has been reflected to some extent in copper, tin and antimony, for the Japanese speculated heavily in all these commodities.

The copper market has been unchanged, producers doing little domestic business and maintaining their nominal quotation of 19c, delivered for prompt and June, 19.25c for July and August. Outside holders, under pressure, offered material down to 18c, refinery and a few scattered sales as low as 17.87½c, were reported. Casting copper prices declined to 17.75c, but little or no metal was obtainable at these prices, makers being short on raw material and booked fairly well ahead. Outside electrolytic is stronger today, 18c to 18.12½c, on prompt. The Waterbury strike has grown worse, and curtailment of consumption in this important center has been a serious factor in the copper market.

Zinc was stronger today at 7.62½c, East St. Louis, for all positions, but inquiry still was light. Large galvanizers have shown little interest in the market, their operations being curtailed by traffic conditions and fuel shortage. Brass special zinc has been scarce and in relatively better demand, the premium of brass special over prime western being greater than usual; business in brass special was done up to 8c, St. Louis.

The lead market showed great strength in nearby positions, due to scarcity of offerings. Prompt shipment was quoted up to 8.87½c to 9c, New York, and 8.62½c, St. Louis, in the outside market, as against the leading producer's quotations of 8.50c and 8.25c, respectively. All of June shipment also was higher, being quoted about 8.62½c, New York, 8.25c to 8.37½c, St. Louis. Demand was moderate. A lot of 1500 tons of Australian lead recently was imported and sold to a large domestic consumer.

The tin market, after a prolonged slump, which had carried prices down about £160 in London and 16c a pound in New York, recovered about the middle of last week, in both markets. This recovery, together with a recovery in sterling exchange rates, brought about an advance of about 2c a pound in Straits tin. The stronger tone in the silver market was a factor. Consumers showed a little more interest than in previous weeks, but buying remained light.

Iron Output Makes Small Gain

While Stacks Produced Average of About 92,041 Tons Per Day in May as Against 91,754 Tons in April Industry Closes Month with Increase of 17 Furnaces in Blast

COKE and anthracite pig iron production for May in tonnage shows little improvement over the April production. Stack activity, however, indicated the industry to be making a slow recovery. Reports indicate 17 more stacks blowing on the last day of May than were blowing on June 30.

With a total of 2,853,276 tons, the May production was a gain of 100,606 tons over April when 2,752,670 tons were made. On an average daily production basis, the May output represents 92,041 tons per day. This is a gain of 287 tons over the April average of 91,754 tons per day.

Steel works or nonmerchant stacks produced 2,022,887 tons or 64,352 tons more than the April figure of 1,958,535 tons. The May average daily was therefore 65,254 tons and only 30 tons less than the April nonmerchant average. Merchant furnaces produced 789,420 tons compared with 761,331 tons in April. The daily rate was 25,465 tons or 88 tons better than the 25,377 tons of the previous month.

Stack activity indicated that some of the furnaces which were forced out of blast recently are getting back into operation. The reports show that eight merchant stacks were blown in during the month and five blown out, making a net gain of three stacks. Steelmaking stacks gained 16 and showed a loss of 2, making a net gain of 14. The total net gain was therefore 17 stacks.

AVERAGE DAILY PRODUCTION

	1920	1919	1918	1917	1916
Jan.	97,172	106,654	77,523	101,930	102,319
Feb.	102,904	105,270	82,704	94,641	106,157
Mar.	108,895	99,614	103,548	105,026	107,343
April	91,754	82,479	109,112	110,936	107,517
May	92,041	67,991	111,351	110,119	108,535
June	.....	70,467	110,538	108,675	107,127
July	.....	78,200	109,954	107,659	103,907
Aug.	.....	88,453	108,983	104,483	103,156
Sept.	.....	82,692	113,774	104,691	106,935
Oct.	.....	60,142	112,335	106,332	113,167
Nov.	.....	80,244	111,595	106,620	110,593
Dec.	.....	84,711	110,602	93,077	102,715
Av.	98,553	83,910	105,293	104,562	106,610

Compromise on Ore

Shipments with Embargoes Against Surplus Supplies Discussed

Cleveland, June 1.—The question or pro-rating carloads of iron ore is still being discussed by some of the shippers, and it is reported that those in favor and those opposed to the plan as suggested by the interstate commerce commission may yet come to an agreement. Following the failure of the shippers to reach an agreement two weeks ago the matter was laid before the commerce commission, but no order has been issued by the commission. It is understood that the shippers are to meet again this week in an effort to work out a plan satisfactory to themselves, the consumers and the commission for co-operation toward expediting the movement of freight cars.

Some of the largest shippers declare themselves still opposed to the suggestion of forming a pool and permitting the Ore and Coal exchange to pro-rate carloads of ore. They would concede that if a furnace interest contracted to purchase a larger tonnage of ore than it can unload and handle promptly than the railroads would be justified in declaring an embargo on surplus shipments, but the opponents of the pooling arrangement maintain that they have no right to offer to abrogate in any way contracts made with them by certain purchasers.

Shipments of iron ore off Lake Erie docks to interior furnaces in May amounted to approximately 2,752,200 tons. In 1918 the shipments off the docks in May amounted to 4,685,099 tons. Little comparison is afforded with May in 1919 owing to the slack demand, but still shipments in May, 1919, exceeded those of last month by 527,134 tons.

MONTHLY PRODUCTION

	1920	1919	1918
January	3,012,373	2,306,279	2,403,227
February	2,984,257	2,947,555	2,318,342
March	3,375,763	3,088,023	3,209,996
April	2,752,670	2,474,374	3,273,355
May	2,853,276	2,107,729	3,451,884
June	.....	2,114,028	3,316,148
Total 1st half..	14,978,344	16,037,988	17,972,852
July	.....	2,424,212	3,408,584
August	.....	2,742,081	3,378,479
September	.....	2,480,790	3,413,223
October	.....	1,864,424	2,482,392
November	.....	2,407,369	2,347,844
December	.....	2,626,074	2,434,114
Total 2d half..	.....	14,544,950	20,464,636
Grand total..	14,978,344	30,582,938	38,437,488

Resigns as Secretary

James T. McCleary has tendered his resignation as secretary of the American Iron and Steel institute and this has been accepted by the directors. Mr. McCleary has occupied the office of secretary of the institute since 1911 and his services during that period have been highly regarded by officers and members alike because of their exceptionally loyal and capable character. Before coming to the American Iron and Steel institute Mr. McCleary had enjoyed a prominent public career. He served for 14 years in congress and in 1907 was appointed by President Roosevelt as assistant postmaster general in charge of the transportation of mails on land and sea. H. H. Cook, assistant secretary of the institute, has been filling the office of secretary temporarily until th directors shall act upon Mr. McCleary's successor.

MAY PIG IRON

States	No. of Stacks	No. in blast last day of month: May	April	Total tonnage made: Merchant	Nonmerchant	Totals: May	April
Pennsylvania	160	114	113	208,962	901,680	1,110,642	1,118,532
Ohio	79	56	47	153,747	349,045	502,792	566,087
Alabama	45	24	23	144,068	66,000	210,068	191,482
Virginia	19	11	11	32,275	.....	32,275	40,598
New York	28	22	21	69,972	150,960	220,932	175,648
New Jersey	5	2	2	5,985	.....	5,985	5,909
Illinois	25	20	17	54,827	231,618	286,445	230,729
Colorado	6	3	3				
Indiana	16	12	10	36,765	263,104	299,869	257,761
Maryland	5	5	5				
Wisconsin	6	3	3				
Kentucky	7	5	5				
Tennessee	16	10	10	56,334	44,189	100,523	92,208
West Virginia	5	4	4				
Washington	1	0	0				
Georgia	2	0	0				
Texas	1	0	0				
Minnesota	3	2	2	26,485	16,291	42,776	40,912
Michigan	3	2	2				
Missouri	1	0	0				
Spiegel—All states						12,914	6,600
Ferro—All states						28,055	26,204
Totals	433	295	278	789,420	2,022,887	2,853,276	2,752,670

Passing Peak in British Prices

Indications Increasing that Reductions Will be Made Soon—Tin Plate and Galvanized Sheets Weaker—Buyers Less Eager—Round Tonnage of American Billets Sold at $96.04, Liverpool—American Tin Plate Mills Sold to India in Competition with British

The Iron Trade Review Staff Cable

European Headquarters,
THE IRON TRADE REVIEW,
16 Regent St., S. W. 1.,

Sterling—$3.92

LONDON, May 31.—While for the time being prices still are tending upward, due to old rather than new causes, indications are increasing that the market is passing the peak, and that prices soon will fall. Latest increases are confined chiefly to Midlands pig iron, as a direct result of an advance in the price of coke. The market for sheet bars has stiffened slightly, while tin plate and galvanized sheets are weaker. Buyers generally are less eager to place orders, except in Scotland, where shipbuilding is maintaining active conditions.

Output is increasing, but under the greatest of difficulties. One large steelworks in the northeastern part of England has been idle for a fortnight, due to railroad congestion. A continuation of the shortage of pig iron has resulted in an increase in the price of Scotch heavy melting steel to £11 10s ($45.08). One more furnace was blown in in England last week, while other furnaces in Middlesborough are preparing for operation. It is reported that exports to neutrals from Middlesborough have been suspended temporarily. The Middlesborough dock strikes has been settled, and the importation of Spanish ore has been resumed.

Semifinished material is scarce in Birmingham. One buyer closed for a round tonnage of American billets at £24 10s ($96.04) c.i.f. Liverpool, for delivery in July. Heavy forges in England operate at 60 per cent.

The failure of Lorraine steelworks to deliver 60,000 tons of steel to British buyers has resulted in diplomatic inquiries. French strikes have collapsed, and industry is slowly resuming. The loss of coal output in France due to the strikes has amounted to 800,000 tons.

Luxemburg foundry iron has been sold for delivery to Belgium at 1000 francs ($65.60) per ton. American foundry iron is being offered at 950 francs ($66.88) c.i.f. Antwerp, this price being 70 francs ($4.93) above the local market.

German business is slack and there is talk in Germany of a general price reduction of 500 to 800 marks. German miners' wages have been advanced 6 marks a day.

The Tata Iron & Steel Co. of India has ordered six tin plate mills from the United States, the lowest British bid having been $80,000 higher.

Foreign Inquiry Falls Off; British Less Confident

European Staff Correspondence

Office of THE IRON TRADE REVIEW,
Prince's Chambers, Corporation St.,

Sterling $3.83

BIRMINGHAM, Eng., May 14.—The rise of 4 shillings, 6 pence (.91) in coal for industrial purposes has been followed in Middlesborough by an advance of 17 shillings, 6 pence ($3.35) per ton in pig iron. The advance has not however, been applied to hematite owing to the substantial reduction in freight rates on ore which now costs 60 shillings ($11.79) per ton delivered in the River Tees, as compared with 72 shillings ($14.08) a month ago. The makers consider this compensates them for the rise in coal, and in view of the very high prices, they are averse to making any further advance. The pressure for the better grade of iron has eased a little, and the makers have a litle to spare for export, a branch of the trade which they are anxious to recover.

The only other definite advance in pig iron has been made in Scotland, No. 3 foundry having been raised to £13 5s ($51.04), furnace. On the west coast of England, however, the list prices are not being adhered to, and the standards may be raised. A general estimate is that steel will be advanced something like £1 ($3.83) per ton. It is likely that a decision will be reached by the steelmakers during the next few days. Scotland, which is taking the lead in price advances, has declared a general rise of £1 ($3.83) per ton in steel. In that district, there appears to be the fullest confidence that the trade will not be affected by any price advance, and the experience so far is that every rise has been followed by a new rush of orders. The stringency has been increased by the amalgamation of leading steel firms with shipbuilders, which has limited the sources of supply for the general buyer. Scotland, like other districts, is suffering from shortage of fuel and materials, with the result that deliveries are greatly in arrears. Heavy orders are being refused, practically in all departments, especially for sheets.

The Midland makers of pig iron have so far made no change in prices. At the Birmingham market several makers declined to accept orders. They pleaded that they are heavily committed, and have no idea what their costs of production will be, the cokemakers not having announced their new prices. They bind their customers, however, to the condition that for all iron now sold the price must be that current on delivery after the new costs of production have been added. This is generally objected to.

Billets are not nominally changed, but quotations vary a good deal. Some sellers decline to accept less than £27 ($103.36) but buyers claim to have bought at £25 10s ($97.61). Welsh sheet bars are easier, having been sold at £29 ($114.07) as compared with the recent figure of £32 ($125.56). Better deliveries are being made in South Wales, owing to a slight easing of the coal situation there, and the larger make of pig iron, due to the lighting of blast furnaces. There is some hope of additional furnaces being started on the west coast, where there is a good deal of unemployed capacity, with a large demand from the Midlands, South Wales, and Scotland, for this iron. A slight improvement in the ore output also is noted.

The Midland makers of iron at pres-

Current Iron and Steel Prices of Europe

British Market

Corrected to Date by Cable

Domestic and Export. Gross Tons at Works

SEMIFINISHED STEEL

	£ s d	$
Billets, soft steel	31. 0.0	121.52
Sheet bars	30. 0.0	117.60

FINISHED STEEL

Steel bars, England, ¾ to 3 inch	31. 0.0	121.52
Ship plates, England	25. 0.0	98.00
Ship plates, Scotland	28. 5.0	110.74
Beams, England	24.10.0	96.04
Beams, Scotland	28. 0.0	109.76
Sheets, black, 24 gage	45. 0.0	176.40
Sheets, galvanized, 24 gage	54. 0.0	211.68
Rails, 60 lbs. and over	23. 5.0	91.14
Tin plate, base box, 108 lbs.	3.12.0	14.11

PIG IRON*

Hematite, Scotch	10.10.0	41.16
Hematite, East Coast Mixed Numbers	13. 0.0	50.96
Middlesborough Basic	11. 7.6	44.59
Middlesborough No. 3	10.17.6	42.63
No. 3 Foundry, Derby, Leicester, Nottingham	12.10.0	49.00
No. 3 Foundry, Northamptonshire	11.12.6	45.57
No. 3 Foundry, Staffordshire	12. 7.6	48.51
Scotch Foundry	12.15.0	53.90
Ferromanganese, 80 per cent	37. 0.0	145.04

*Pig iron quotations are f.o.b. furnace for delivery in the United Kingdom. Export prices generally are subject to free negotiation.

COKE

Yorkshire furnace	3. 5.3	12.79
Yorkshire foundry	4. 0.0	15.68

French Market

Prices Last Reported

PIG IRON

	Francs per metric ton (2205 lbs.)	$
Hematite, Lorraine	840 to 890	55.10 to 58.38
Foundry, Longwy, 3 per cent Si., sand-cast	590	38.70
Foundry, Longwy, 3 per cent Si., chill-cast	640	41.98
Foundry, Longwy, 2 per cent Si., sand-cast	587	38.51
Foundry, Longwy, 2 per cent Si., chill-cast	620	40.67

COKE

French furnace	245	16.07
German, Belgium and British furnace	275	18.04

SEMIFINISHED STEEL

Blooms	945	61.99
Billets	945	61.99
Sheet bars	1195	78.39

FINISHED STEEL

	Francs per 100 kilos (220 lbs.)	$
Merchant bars	145	9.51
Angles	145	9.51
Normal beams and profiles	140	9.18
*Plates bridge and tank, 5 millimeters and thicker	159	10.43
*Sheets, black, 3 millimeters	171	11.22

Pig iron prices are f.o.b. furnace; semifinished steel prices f.o.b. works; finished steel prices, according to the schedule of the Paris Consortium of Iron and Steel dealers, delivered, except (*) which are from schedule of the Comptoir des Toles.

Belgian Market

Prices Last Reported

PIG IRON

	Francs per metric ton (2205 lbs.)	$
Foundry, 3 per cent silicon, Belgian	850 to 900	59.92 to 63.36
Basic-bessemer, Luxemburg	885 to 900	62.30 to 63.36
Basic, open-hearth, Belgian	800 to 825	56.32 to 58.08

SEMIFINISHED STEEL

Blooms	1150	80.96
Billets	1200	84.48
Sheet bars	1250	88.00
Wire rods	2000 to 2100	140.80 to 147.84
Standard rails	1550	109.12

FINISHED MATERIAL

	Francs per 100 kilos (220 lbs.)	$
Merchant bars	145 to 150	10.21 to 10.56
Normal beams and profiles	150 to 155	10.56 to 10.91
Plates, 5 millimeter and thicker	160 to 175	11.26 to 12.32
Sheets, black, 3 millimeters	190 to 200	13.38 to 14.08
Sheets, galvanized, 3 millimeters	380 to 400	26.75 to 28.16

*Sold on same basis as semifinished material.

All prices f.o.b. furnace or works, except finished material, for which delivered prices are quoted

ent are waiting for the new pig iron prices, before deciding what is to be done to recoup themselves for the higher price of coal. The Staffordshire iron trade with its old fashioned puddling and mill furnaces is a heavy consumer of coal, in proportion to the output, and it is agreed that some increase in price will have to be made. In this matter, Scotland also has taken the lead by putting up its Crown bars from £28 ($110.24) to £30 ($117.90).

Supplies Inadequate for Export Needs

European Staff Correspondence

MIDDLESBOROUGH, Eng., May 10.—Conditions at present governing the export of pig iron and finished steel from Great Britain continue on an abnormal plane. With a home demand that absorbs practically all of the production, the wants of continental buyers can be met only in a very inadequate manner. During the past month there have been keen inquiries for deliveries abroad and the score and a half of countries whose buyers have been interested in the British market, secured among them a total of 64,880 tons of material in April, compared with 48,827 tons exported in March, which in turn was about 1500 tons above the February total. The April exports consisted of 28,712 tons of finished steel, 33,750 tons of pig iron, and 2418 tons of rolled iron. Germany which in days gone by was a consistent and heavy buyer, in April was an importer of but 300 tons of pig iron from the United Kingdom, a total which was in advance of her March deliveries by 100 tons. Belgium continues to be one of the best customers of Great Britain; the deliveries to that country during April totaled 11,157 tons, this being slightly over 1000 tons more than the quantity supplied during March. Exports to India, however, have shown a falling off.

A noticeable feature of the April export business is the leap made by Italy and Japan. The former's deliveries during March included only 200 tons of pig iron, but in April the needs of the Mediterranean ally had to be met by shipments of 13,381 tons of pig iron and 483 tons of steel. Japan too increased her shipments of steel from 1032 tons in March to 8233 tons in April, the combined exports of iron and steel to Japan for the two months being 5249 tons in March and 13,199 tons in April.

April shipments from the Tees were 2487 tons to France, and to all the allies the f.o.b. price is nominally 5 shillings ($0.95) a ton above the home selling price of £10 ($38.50) a ton for Cleveland G. M. B. pig iron.

There is a steady increase in the amount of tonnage being handled coastwise from the Tees, a traffic which was very heavy before the war.

(*Concluded on Page* 1631)

Industry's Leaders Are Confident

Express Faith at Iron and Steel Institute Meeting That Country Gradually Will Readjust Itself to Sounder and More Stable Prosperity—Demonstration for Judge Gary for President Marks Notable Gathering

SOUND faith in the sober common sense of the majority of the American people to restore the country to its former basis of thrift and efficiency and to win back a stable prosperity, was expressed at the seventeenth general meeting of the American Iron and Steel institute at the Hotel Commodore, New York, May 28. In this movement which already is under way according to present indications, the iron and steel industry expects to be called upon to perform a large part. Judge Gary sounding a note of confidence in the eventual result, called upon the iron and steel manufacturers of the country to rally to the present national problems with the same whole-souled and clear-headed co-operation that had characterized their efforts in the war period and during the uncertain days of 1907.

Manifestation of a widespread sentiment for an administration of the government in accordance with definite business principles was given in an impressive fashion on different occasions. This spirit crystallized in several notable demonstrations at the banquet, Friday evening at the suggestion that Judge Gary possessed all the qualifications to make him an ideal candidate for the presidency of the United States.

The meeting was customarily large about 1400 attending. The size of the assemblage called forth comment upon the growth of the institute in the 10 years of its life. The membership now approximates 2500.

ENTHUSIASTIC acclaim of repeated references to Judge Gary's fitness for the presidency proved the outstanding feature of the banquet Friday night. J. G. Butler Jr. broached the subject when he said: "This morning we heard Judge Gary describe the qualifications which the next president of the United States should possess. If he had added 50 per cent to these, his specifications would have applied to himself." Cheers greeted this statement. Later, Charles M. Schwab told what Judge Gary's counsel and leadership during the 20 years of the organization of the Steel corporation, had meant to the iron and steel industry of the United States and gave his conception of what the next president of the United States should be. "He should be a business man whose ability has been proved and who would select those best fitted to carry on the various departments of the government under his direction without regard to political affiliations. Judge Gary has proved his ability to pick the right men to get things accomplished and he would demonstrate this ability in that great office." At this juncture, three cheers for Judge Gary were called for, and the response from the entire assemblage was spontaneous and enthusiastic.

Reviews Steel's War Record

J. G. Butler Jr. effectively presented a more complete form of the war service of the American iron and steel industry, under the title of "The Iron and Steel Industries in War Work and Financing." He said:

The amount of steel contributed to the combined armies and navies of the allied countries during the war cannot be stated with exactness but a conservative estimate made from the latest information at hand, places this at the stupendous figure of not less than 100,000,000 tons. Much of this was used indirectly for war purposes and a considerable portion of it consumed in this country. Nevertheless it was a part, in one form or another, of the vast machine by which the war was won.

Fortunately it is possible to present the facts concerning the contribution made by the iron and steel industries in the form of men and money, more exactly than those in regard to the tonnage of steel supplied to our government and its allies. The American Iron and Steel institute sent out inquiries to its contributing membership of plants of all kinds. The replies embraced reports made by 568 steel companies in the United States and include all except a comparatively few smaller concerns, statistics from which would not materially change the total.

These statistics have been arranged in three groups. The first shows the number of officers and employes of the companies reporting who were engaged in the service of the United States and enrolled in regular organizations in the army, navy and aviation corps, together with the number of voluntarily engaged in auxiliary war work in various organizations approved by the government. The second group gives the total subscriptions to Liberty loans made by officers and employes of these companies, arranged so as to indicate the nature of the securities and the amount of each taken by corporations and their employes wherever possible. The third group gives in detail for 56 leading companies the number of men in service, the amount of securities purchased by companies and by employes (or by both where this was not separated on the records), and the grand total of subscriptions and enlistments for these 56 companies and for all of the companies reporting, 568 in number.

It is worthy of note that the group of 56 companies referred to above sent into the service more than 80 per cent of the total enlisting, and at the same time subscribed about 82 per cent of the total amount invested in war securities. This group included no companies subscribing for less than a total of $2,000,000. More than 33 companies, in addition to these 56, purchased securities in excess of $1,000,000. A striking fact in this connection is the report by all of the 56 companies that their employes were 100 per cent enrolled as purchasers of bonds during the war, as well as that the employes of some of the smaller companies whose detailed statement could not be included herewith were among the largest buyers of both bonds and war savings stamps.

Reference should be made also to the relatively large number of executives included among those who enlisted in the various branches of the service, as well as to the number of these who won special honor therein. An effort to secure information on this point met with so much reluctance to have individual records made public that the idea of doing so had to be abandoned but it is a fact that the number of rising young executives who laid down their tasks at the beginning of the war, and even before it actually begun, to go the front, was astonishingly large.

These statistics given indicate that the iron and steel industries of this country contributed 131,504 men to the service of the country during the war, and supplied funds to the amount of nearly $700,000,000 for the prosecution of the struggle. It is a matter of deep regret that no adequate records have been kept by the greater number of companies concerning the contributions made by them and their employes in funds for war work, such as the Red Cross, the Young Men's Christian association, the Knights of Columbus and probably other organizations.

Many claims are made as to who won the war. It is fair to say that American steel played a very important part. It is my intention to endeavor to obtain statistics showing the income tax and all other forms of taxation made upon and paid by

the steel producing interests. These figures will show the large sums exacted and possibly aid in the publicity very much needed to contradict the wild stories prevalent of the enormous profits made by the producers of steel.

Willis L. King recounted the great development of the American Iron and Steel institute in the 10 years of its growth and gave some ideas and his part of what its sphere of wider usefullness in the future should consist. He expressed the opinion that the organization should take a more active attitude in politics, though not along partisan lines. Capt. Robert W. Hunt, of R. W. Hunt & Co., Chicago, gave some interesting reminiscenses of the early days of the iron and steel industry in this country. He made a plea for honest effort and the application of homely principles as a remedy for freeing the country from some of its present conditions of extravagance and inefficiency. He reverted again to the practicability of importing Chinese labor under contract as a means of relieving the labor shortage in the industries and on the farms of the country. W. U. Follansbee of the Follansbee Bros. Co., humorously depicted the problems of the steel works executive of the present day, brought about by labor conditions. upset transportation and other disturbing factors. Prof. Henry M. Howe emphatically declared that this country should exert its influence to see that stern measures against Germany, including disarmament, exaction of heavy indemnities, occupation of the west bank of the Rhine, etc., should be carried out as measures of protection for the United States against the reassertion of the spirit of conquest and of force which was to be expected from an unchastened Prussia.

Judge Gary preceded his formal address at the opening session with extended extemporaneous remarks. After congratulating those present on their membership in the American Iron and Steel institute and loyalty to that body, Judge Gary said: "The institute has become one of the leading associations of the United States, if not of the world. You have a commanding influence concerning the industrial affairs of this country. We may well be proud of our progress of the past 10 years. On this occasion I cannot forget the words of our beloved associate, during the dark days of 1907. He said: 'A voice rang out clear and loud—steady boys, and play the game and play it fair'—and you played it and played it well. This same spirit in war rendered a great and effective service in saving the country and its associates from danger and destruction, because of the universal loyalty on your part in furnishing what was regarded by the government as the greatest essential of the war. Whatever might be said, which may have hurt your feelings and may have been undeserved they can never take from you the credit to which you are entitled.

"We are again passing through a critical period. We would be more than foolish, however, optimistic, to deny this fact. You have your place and influence and you may be depended upon to do your full share of whatever work is called forth by the necessities of the occasion, in protecting the people, the business and the country. Again you are called upon to play the game and to play it fairly. You will respond nobly and with alacrity. You will exert a powerful influence by your steady, clear-headed conduct in protecting your business and the general public."

Judge Gary Analyzes Conditions

Judge Gary then presented his formal address, which was an analysis of the prevailing conditions in the country with reference to their bearing upon future relations of government, ending with a climax of patriotic optimism. His address was warmly applauded.

In the presentation of the regular program, George Otis Smith, director of the United States geological survey, discussed "Industry's Need of Oil." A paper by C. L. Close, manager of the bureau of safety, sanitation and welfare of the United States Steel Corp., described comprehensively "Welfare Work in the Steel Industry." At its conclusion, moving pictures were given illustrating some of the methods employed for improving working and living conditions about the works. At the suggestion of Mr. Schwab, a vote of thanks was rendered Mr. Close for his very complete exposition of this subject. Following a buffet lunch, at which the members were guests of the institute, the program was resumed. "Fatigue of Metals Under Repeated Stress," was presented by H. F. Moore, research professor of engineering material of the University of Illinois. F. C. Cottrell, director of the bureau of mines, presented informally various aspects of "The Future of Oxygen in Enrichment of the Air in Metallurgical Operations," with particular reference to the blast furnace and steelmaking operations. He expressed the opinion that the field in this direction was most logical and practicable with reference to the open hearth and the converter, because of the more stationary and the less variable charge, and the better control of temperatures which would permit the bringing about of desired reactions than in the case of the blast furnace. The paper was discussed by M. H. Roberts, consulting engineer of the Air Reduction Co. of New York, who brought out certain commercial and engineering phases of the subject. He said it was difficult to produce oxygen today under the existing processes at a rate of less than $25 to $35 per ton of steel, whereas to interest large production users, such as the steelmakers, would require a cost of $2 to $3 per ton. F. G. Norton, vice president of the Norton Co., Worcester, Mass., told of the tremendous reduction of cost in the production of oxygen which had been brought about through development work carried on by his company. He said his company was prepared to show that for a 500-ton blast furnace, oxygen could be produced at 7½ cents per 1000 cubic feet, which is approximately one-twelfth of the present rate. C. A. Meissener, chairman of the blast furnace committee of the Steel corporation, stated that up to the present time the investigations of the Steel corporation had shown that the value of the use of oxygen in blast furnaces was problematical, and that it would involve undoubtedly considerable redesign of existing blast furnace lines to make it so. Prof. Albert Sauveur of Harvard university, discussed the microscope and the heat treatment of steel, using slides. A discussion was presented by D. K. Burgess of the bureau of standards, Washington. C. A. Witter, of the Provident Engineering Co., Philadelphia, by means of slides, described "A Method of Producing Pipeless Rolled Products from Angular Blooms," with particular reference to steel rails. T. H. Mathias, general superintendent of the Lackawanna Steel Co., at the plant of which experiments with the Witter process were conducted, discussed the method from the standpoint of successful manufacturing.

The final paper of the day was on the acid-open hearth process, by B. deMare, superintendent of the open hearth department of the Midvale Steel & Ordnance Co., Philadelphia. This was discussed by S. S. Ball, superintendent of the open hearth department of the Bethlehem Steel Co., South Bethlehem, Pa., by Lawford H. Fry of the Standard Steel Works Co., Burhnam, Pa., and by R. F. Flinterman of the Michigan Steel Castings Co., Detroit.

Spirit of Unity Will Rule Land

Evil Doctrines of the Vicious Elements, the Demagogues and the Misguided Will be Shattered by Common Sense and Americanism—Individual Responsibility Will be Recognized—Stability and Prosperity Finally Will Prevail

BY E. H. GARY

IN THIS presence it may be asserted, without thought of contradiction, our country is the best of all.

As frequently stated, notwithstanding the United States has only 6 per cent of the world's population and 7 per cent of the world's land, yet we produce: 20 per cent of the world's supply of gold; 25 per cent of the world's supply of wheat; 40 per cent of the world's supply of iron and steel; 40 per cent of the world's supply of lead; 40 per cent of the world's supply of silver; 50 per cent of the world's supply of zinc; 52 per cent of the world's supply of coal; 60 per cent of the world's supply of aluminum; 60 per cent of the world's supply of copper; 60 per cent of the world's supply of cotton; 66 per cent of the world's supply of oil; 75 per cent of the world's supply of corn; and 85 per cent of the world's supply of automobiles.

Better still, we have constitutional freedom; protection of life, liberty and property. If, in any respect, these principles are violated, it is by individuals and not by sanction of fundamental laws.

Possessed of these natural resources and opportunities a moral, intelligent and industrious people have reached the first place in worthy achievement. Hence, persons from every part of the world have come to the United States to better their condition by participating in the blessings which are here provided. For no other reason, except an intention to wantonly attack, destroy and forcibly appropriate, would foreigners settle in our midst.

The great majority of immigrants have come with pure motives. They have been welcomed by their predecessors and eagerly and gladly have become a part of the mass of loyal and deserving citizens.

However, we need not close our eyes and ears to the utterances of learned men in editorials, lectures, public addresses and private speech, to the effect that even our government itself is threatened at the present time; that for some months there has been and still is being carried on propaganda, instigated and controlled by vicious men, mostly foreigners, which tends to create a feeling of unrest, dissatisfaction and antagonisms.

Human nature, weak and greedy, is easily affected. The minds of considerable numbers, due to war conditions, resulting in privation, suffering and misery in some cases and temporary possession of unusual funds in others, are abnormal, and false and wicked doctrines are apt to find lodgment. Advantage has been taken of these natural tendencies by unprincipled men, some of them really enemies of the United States, others merely demagogues, all actuated by the desire to promote personal gain. Numbers of men who are loyal Americans, some giving evil advice and others receptive ears, will hereafter entertain feelings of regret and shame for their part in the public discussions of today.

Worker's Heart Sound

THE great masses of employes, if left to decide for themselves, are loyal to the country, to the public interest and to their employers; and to the extent of this loyalty they will be rewarded up to the full measure of their deserts. This they will have the right to demand; and it will be readily and cheerfully accorded. They also should, and they will, continuously exercise a disposition to conciliate and co-operate.

The present so-called labor strikes, involving riot and injury to property and person, are instigated as a part of the campaign to disturb and demoralize the social and economic conditions of the country. In other lands very serious results have been accomplished by the same means which have been employed here.

Is the disease of unjustified unrest and revolt now discernible progressive? Will large numbers of our population be influenced? Is the ship of state in danger? Is she headed for the rocks? Is there a possibility of increasing storms to a degree which would drive her to destruction?

The safe, efficacious and natural remedy for the perils which have been hinted at are to be found only in unity of purpose and effort on the part of the whole crew on board our ship of state, which includes everyone who is blessed with the privileges of citizenship in the United States; an undivided loyalty to the principles of our constitution and all the laws which are passed in conformity to it. This will eliminate from the social structure the vicious elements. Sad to say, there is not at present, nor has been in the past, perfect harmony of action between the masses of the people.

In a discussion of this kind there should be a frank admission that no one is without fault; that every variety of human nature may justly be censured. And for purposes of illustration, we may refer to groups of persons and interests.

Who compose the first? Those who have accumulated property; if so, how much?

Who make up the second? Those who work with their hands; if so, with the shovel, the lever of a machine or the pen?

Who constitute the third? Those who neither possess pecuniary resources nor perform any labor? If so, there is none to be considered in this connection, for the group would be small in numbers and subjects of charity or public control. Obviously, the public is made up of the entire population.

I will, for present purposes, place the members of this large audience in the first group. Most of you are possessed of accumulated savings and occupy important positions, although you started from the lowest rung of the ladder of success, and because of merit and hard work have reached your present station in life. You have, in management, in greater or less degree, marked responsibilities in regard to each and all of the groups described. You could not shirk or minimize them if you desired to do so. As a business citizen you must account to others for your stewardship. What you say, what you do, will have an important influence in national, even international affairs. It will be good or bad. You must consistently observe the principles of the constitution, the provisions of the laws of the land, the rights and interests of your neighbors, including your employes, customers, com-

Presidential address presented before the American Iron and Steel Institute at New York.

petitors and the general public. You must be unselfish, reasonable, fair, sincere and honest. You should, without interruption, give evidence of a disposition to conciliate and co-operate. Regardless of the past, even though you may believe you have been unjustly treated or censured, you should and will make and keep resolutions for the future which you know are proper. All this, of course, applies with full force to your president.

If we adhere firmly to these principles, if we are steadfast and true; and then courageously, though modestly, proclaim our rights and insist upon proper consideration in return it will be accorded. We have heretofore been somewhat backward in this respect.

Employes generally are included in the second group. With all others they have full and equal rights and responsibilities. They must and will realize that their advancement and contentment depend upon the progress and prosperity of the employers; that, except for the willing and free investment of capital up to the requirements of business demands, together with full co-operative assistance on the part of the best talent, enterprise and initiative would languish and disappear and that indifference and idleness would be substituted.

Agitators who are trying to create trouble between employes and their employers as a rule are insincere and selfish. Generally, they, themselves, have performed no hard labor, nor had experience which qualifies them to lead or instruct. They strive for personal popularity and gain. Their business is better, their compensation increased, when others are in trouble. Assuming to be sympathetic and superior in intelligence, they mislead and often misrepresent. They promise reforms, but their methods lead to trouble and loss to others. In this list are included a few writers, lecturers, public speakers and self-appointed labor leaders, so called.

We sometimes hear a man claim that the world, or the nation or the public owes him a living. This is foolish and preposterous. There is due every citizen of this country no more and no less than the same opportunity to procure a living that is accorded any other. This is the full measure of fairness and justice. The state cannot furnish to the individual natural ability or disposition. The honest man who reads, studies, thinks, works, economizes, saves, persists and uses his best judgment will succeed in this country. If he is neglectful, indolent, profligate and dishonest, he will fail. A large majority of the men of the United States who have become prominent in statesmanship, finance, professional or business life, started from an humble beginning; and, by their own endeavor, have advanced. Ordinarily the men who complain because of their poverty or position in life have only themselves to blame. There are exceptions, such as those who are naturally or otherwise disabled at birth or later, and they are entitled to and do receive public assistance; but, as a rule, those who do not prosper are indifferent to worthy accomplisment, or partly so. In every department of life in this country, in the mill, the shop, the store, the bank, the office, the profession, the schools, one may, so far as opportunity is concerned, start at the bottom, and, by his own energy and faithfulness, progress even to the top. We who are present on this occasion know by experience this is true.

In the classification suggested, the public comprehends every citizen except the individual who is discussing the subject. Speaking of men we can define interest only as either public or private. Depending upon the question under consideration, we may embrace in the word "public" a community, a village, city, county, commonwealth or nation; but the question comes back to either public or private interest.

As each individual in the groups heretofore mentioned is obligated to conduct himself or herself in such manner as to promote and not impair the public welfare, so the public is likewise responsible to the individual. In public discussions, and occasionally in newspaper editorials, it is frequently assumed that there is no corresponding and reciprocal duty on the part of the general public whom, at the particular time, the speaker or writer attempts to represent. Unjust attacks or criticisms against individual interests, sometimes promiscuous, in other instances by name, are made from a biased standpoint or upon distortion of the facts. The exact truth is not infrequently ignored or overlooked. Many able discources in the press, in the congress of the United States, by public officials, even from the pulpit, are based on a misstatement of the facts.

The speakers or writers who are recklessly unjust are rare exceptions. But for this reason, if for no other, they perhaps receive more extended notice. And they are a part of the general public and from that viewpoint claim to prepare and deliver their dissertations.

The voluntcer guardians of the public welfare and of private individuals and interests are numerous and audacious. They wrap about themselves the cloak of self-righteousness and proclaim from the housetops. The public has a duty to perform in exposing and controverting hypocrisy and sham on the part of the reckless and irresponsible. In its own interest it is bound to protect private property, private business and capital, and of course, most of all, them that are least capable of caring for themselves.

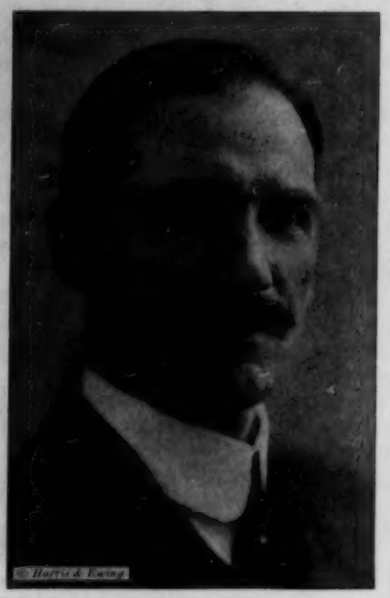
The general public, whether it is represented by governmental heads, by congress or otherwise, should co-operate with and assist private enterprise. Every department of government has responsibilities and opportunities of magnitude at this particular period in our history, remembering that general prosperity is the first essential. They can do much toward the preservation or destruction of the ship of state. They can by precept and example contribute in rehabilitating and re-establishing the affairs of this country. For constructive statesmanship, which will add to stability and progress in the moral, economic, social and political life of the nation, they will be entitled to the commendation of all mankind; while by a narrow-minded, partisan, fault-finding, destructive policy, they will create discord, distress and demoralization. The majority of the people of this country are tired of petty animosities, of unreasonable rewards or punishments, of undue restrictions or liberality concerning public or private undertakings. They are disgusted with muckraking, which usually is conducted for the glorification of the inquisitor and at a large expense to the public.

We have reason to expect, and I firmly believe, that now and henceforth, more than ever before in our history, a spirit of unity will pervade and control the minds of all the citizens from the President down; that each one will recognize a personal responsiblity to his country and to all its inhabitants; that strictest economy in expenditures and management, lowest costs, and proper compensation for faithful performance will be the universal sentiment; and that order, stability, advancement and prosperity will surely follow.

The Next President

A WORD concerning the next president—the captain of the ship of state. There must be selected one who is able, wise and well-informed, of unquestioned honesty, morally and intellectually, eminently fair and impartial, frank and sincere, broad-minded, deeply sympathetic, courageous, sturdy and well balanced; and above everything else, loyal to the constitution and the laws of the land.

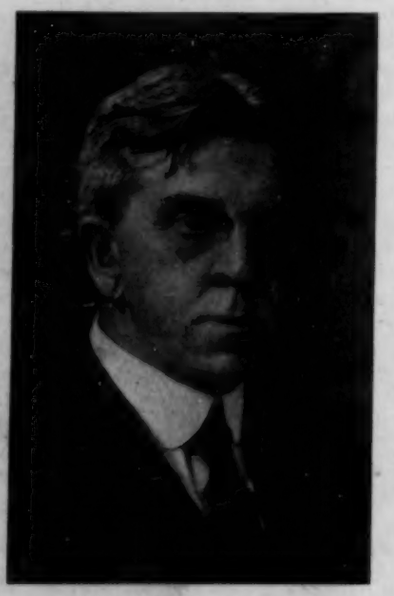
Experts Outline Progress of Industry



F. G. COTTRELL
Director, Bureau of Mines, Washington

FREDERICK G. COTTRELL, inventor of the Cottrell process for the electrical precipitation of fume and fine particles in flue gases, was born in Oakland, Cal., Jan. 10, 1877. He was graduated from the University of California in 1896 with the degree of bachelor of science, and studied at the University of Berlin and the University of Leipzig in 1901 and 1902, receiving from the latter the degree of master of arts and doctor of philosophy. In 1902 he was appointed instructor in physical chemistry at the University of California and served as assistant professor from 1906 to 1911. Dr. Cottrell was appointed chief physical chemist of the bureau of mines in 1911, was made chief chemist in 1914, chief metallurgist in 1916, and assistant director of the bureau in 1919. Recently he was nominated by President Wilson for director of the bureau.

* * *



R. de MARE
Superintendent, Open-Hearth Department, Midvale Steel & Ordnance Co.

R. DE MARE was born in Sweden. He graduated from the Mining school at Falun, that country, and came to the United States in 1887. He has been connected with the Nicetown plant of the Midvale Steel Co., and its successor, the Midvale Steel & Ordnance Co., since 1892. His first connection was in the drawing room. He became assistant in the open-hearth department in 1895 and he was given charge of the new open-hearth plant at Nicetown in 1904, and still has charge of it. In addition he has supervised the original open-hearth since 1916 and since 1920, the crucible and electric furnace departments.

* * *

ALBERT SAUVEUR was born in Belgium, June 21, 1863. He was educated in the School of Mines and Massachussetts Institute of Technology, from which he graduated in 1889. From 1889 to 1891 he was connected with the chemical laboratory of the Pennsylvania Steel Co., at Steelton, Pa. From 1891 to 1896 he was with the Illinois Steel Co. at South Chicago in charge of the experimental laboratory, and from 1897 to 1905 he was manager and proprietor of the Boston Testing laboratory. He also was lecturer in metallurgy at the Massachussetts Institute of Technology, 1898 to 1905. He was instructor at Harvard university, 1899 to 1900, assistant professor from 1900 to 1905, and professor since then.

* * *

GEORGE OTIS SMITH, director, United States geological survey, who contributed a paper on "Industry's Need of Oil," was born in Hodgdon, Me., Feb. 22, 1871. He was graduated from Colby college with the degree of bachelor of arts in 1893, and studied geology at Johns Hopkins university from 1893 to 1896. Subsequently he engaged in geological work in the states of Michigan, Utah, Washington, and in New England. He was geologist with the United States geological survey from 1896 to 1907 and has been director of the survey since the latter year. He has written many articles on geology in the United States.

ALBERT SAUVEUR
Professor of Metallurgy, Havard University

GEORGE OTIS SMITH
Director, United States Geological Survey

Speak Before Iron and Steel Institute

H. F. MOORE
Research Professor, University of Illinois

H F. MOORE graduated from New Hampshire college in 1898, and from Cornell university in 1899, with the degree of mechanical engineer. From 1900 to 1913 he was instructor in machine design at Cornell, and subsequently served for a year as mechanical engineer with Riehle Bros. Testing Machine Co., Philadelphia. He was instructor and assistant professor of mechanics in charge of the materials testing laboratory at the University of Wisconsin, 1904 to 1907, and in the latter year became assistant professor of engineering materials, engineering experiment station, University of Illinois. He is now research professor with this university. At present he is in charge of the joint investigation of the fatigue of metals, under the auspices of the National Research council, Engineering Foundation, and the Illinois engineering experiment station.

* * *

J. B. KOMMERS
Research Associate Professor, University of Illinois

J B. KOMMERS graduated from the college of engineering, University of Wisconsin, in 1906 and subsequently was associated with the Chicago Telephone Co. for one year. From 1907 to 1920 he was with the University of Wisconsin as instructor and assistant professor of applied mechanics, strength of materials, and testing materials. He has published a number of papers and articles on the testing of cast iron and steel, especially as related to repeated stresses. He wrote the chapter on "Fatigue of Metals" for the latest edition of Johnson's *Materials of Construction.* Since February, 1920, he has been associate professor of engineering materials at the University of Illinois, and engineer of tests in connection with the joint investigation of the fatigue of metals by the National Research council, Engineering Foundation, and the Illinois Engineering experiment station.

* * *

C. L. CLOSE
Manager, Bureau of Safety, Sanitation and Welfare, United States Steel Corp.

C HARLES L. CLOSE, one of the foremost and most successful figures in the devolpment of safety, sanitation and welfare work in the iron and steel industry, was born at Shelby, O., and first began his career by entering the employ of the Shelby Steel Tube Co., Shelby, 27 years ago. Later he was transferred to that company's Greenville, Pa., plant as assistant superintendent, after which he was promoted to the position of superintendent. His first connection with the safety profession was in 1908 when he was appointed safety inspector of the National Tube Co. In 1911, he was made manager of the newly created bureau of safety, sanitation and welfare of the United States Steel Corp., with headquarters in New York, and since then has been engaged in promoting and co-ordinating safety, sanitation and welfare work at the plants of the subsidiary companies of the Steel corporation.

* * *

C A. WITTER, who read a paper entitled "A Method of Producing Pipeless Rolled Products From Annular Blooms," is associated with the Provident Engineering Co., Philadelphia.

C. A. WITTER
Provident Engineering Co., Philadelphia

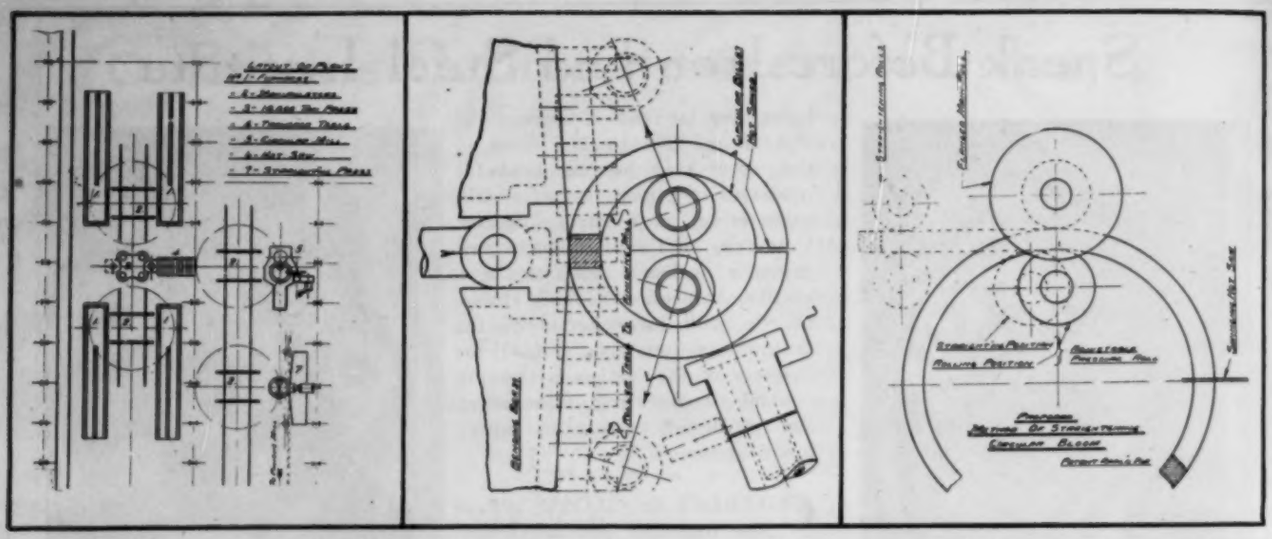


Fig. 1—Progressive steps involved in present process from ingot to finished rail—Fig. 2—Steps involved in manufacture of pipeless rails from annular blooms—Fig. 3—Method used in forming bloom under 10,000-ton press

Rolling Rails From Annular Blooms

BY C. A. WITTER

BY EMPLOYING a new method of rolling lineal products, such as rails, blooms, billets and bars, it is possible in a practical way to produce products free from piping and segregation. The longitudinal axis of the ingot is entirely eliminated from any point in the cross section of the finished material the yield from the ingot is increased from 15 to 20 per cent over the present accepted methods, and a homogeneous product with an inherent physical structure superior to that now obtained is produced. The process is a combination of existing proved practices involving the addition of only one new and novel operation, which is purely mechanical and has been developed as it would apply to large tonnage products, such as rails, blooms, etc.

Fig. 1 shows roughly the progressive steps involved in the present process of manufacture from the ingot to the finished rail, and as approved by the leading trunk lines and adopted by the various mills. This illustration shows the conventional type of rectangular ingot, which can be of any approved shape or size, depending on the section of rail rolled and number of multiple lengths allowed from one ingot. On the basis of a gross yield of 70 per cent of the ingot in finished rail product, as obtained under the present method of manufacture, 1430 tons of ingots are required to produce 1000 tons of finished rails.

Fig. 2 shows the progressive steps involved in the manufacture of pipeless rails from annular blooms. The idea of eliminating the center or longitudinal axis of the ingot from the cross section of the finished product suggested this process. An ingot similar to that which has been used so successfully in the past 10 years for rolled steel wheels, tires and other annular products is used. The manufacture of this type of ingot is described in detail in a paper presented by Lawford H. Fry to the American Iron and Steel institute, November, 1919.

After the ingot has been poured, it is allowed to cool, and is thoroughly reheated in a continuous furnace. The reheating accounts for the 3 per cent loss as shown on the margin. The hot ingots could be used as at present, but to insure freedom from the oxidized top of the ingot appearing in any point of the rail, a punch of larger diameter than the diameter of the ingot can be used. This slightly increases the percentage of loss in the punching, which is offset, however, by the reduction in the heating loss to about 1½ per cent.

The ingot is then placed under a

From a paper presented at the annual meeting of the American Iron and Steel institute, New York, May 28, 1920.

FIG. 4—CONDITION OF FIRST TEST PIECE WHEN BROKEN ON SIXTH BLOW—FIG. 5—CONDITION OF SECOND TEST PIECE WHEN BROKEN ON THIRD BLOW—FIG. 6—NATURE OF BREAK IN BASE OF SECOND RAIL TESTED

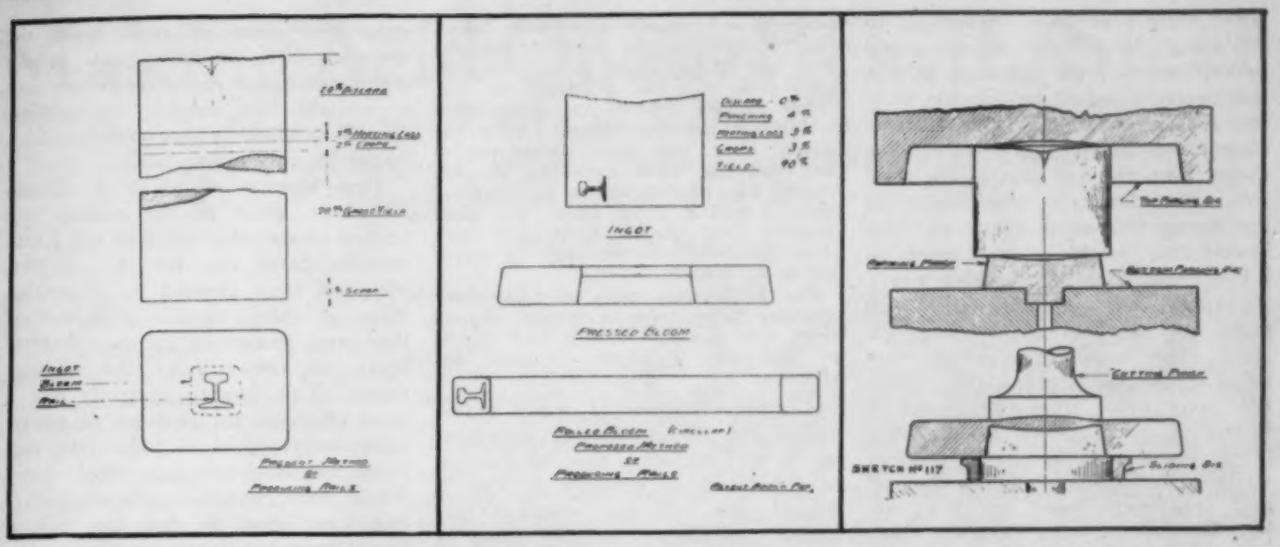


FIG. 7—PROPOSED LAYOUT REQUIRED FOR PRELIMINARY OPERATIONS—FIG. 8—METHOD OF STRAIGHTENING CIRCULAR BLOOM—FIG. 9—A SECOND METHOD OF STRAIGHTENING CIRCULAR BLOOM AFTER ROLLING

10,000-ton hydraulic press and bloomed to the desired width. A hole is punched in the bloom in the same operation, removing piping and segregation, and to the required size to permit the bloom being placed over the pressure roll of the blooming mill, which is of the same general type as used in rolling tires.

The bloom is then rolled to the necessary diameter, to give the required thickness.

The new and novel operation referred to in the second paragraph consists in the cutting and straightening of the circular bloom. Fig. 3 shows the method used in forming the bloom under 10,000-ton press. The bottom punch and the top die are cupped, which prevents the piping or segregation from spreading during the forging operation, and confines it in a double convex disc form, as shown in the lower illustration, which shows the bloom with the cutting punch in position ready to remove the burr or punching.

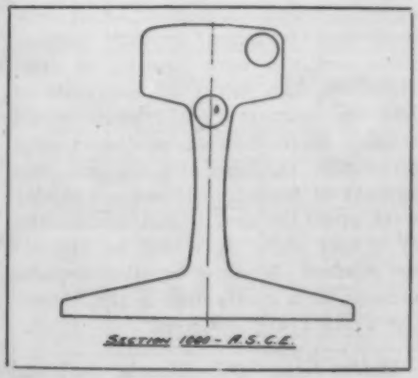
With this method of producing the bloom, the ingot is centered directly on top of the bottom punch, over which the ingot is forced down to the required width.

The press is equipped with a bottom push-up cylinder, which has a ram that extends through the center of the platen. This, after the bloom has been forged, is raised, which allows the sliding die to be placed under the bloom and gives it the necessary support while the cutting punch broaches the burr or punching. This eliminates the necessity of turning the bloom and punching from both sides.

Fig. 9 shows one method of splitting and straightening the circular bloom on the mill immediately after rolling to size. The cutting is done with an adjustable swinging hot saw accommodating any diameter of bloom, depending on whether the ingots were poured for single or multiple lengths. After the bloom has been sawed, the pressure roll is advanced ahead of center to guide the bloom through a pair of straightening rolls, from which it passes direct to the finishing mill.

Fig. 8 indicates another method of straightening the circular bloom. The machine would be independent of the blooming mill, making it a separate operation. This would eliminate two operations in the circular blooming mill, thereby materially increasing the capacity of same. The machine could be driven by motor or hydraulic power and could be designed to operate either vertically or horizontally, the

FIG. 10—SULPHUR PRINT OF RAIL FROM MIDDLE OF FIRST BLOOM



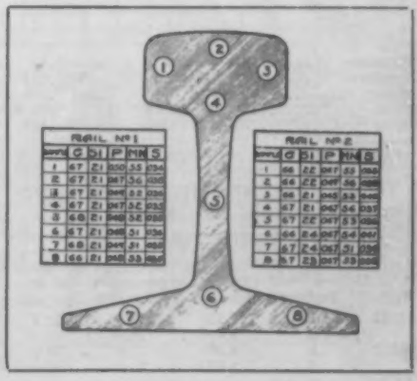


FIG. 11—LOCATION ON RAIL FROM WHICH DRILLINGS FOR ANALYSES AND TESTS WERE TAKEN FIG. 12—SULPHUR PRINT TAKEN FROM MIDDLE OF THE SECOND BLOOM FIG. 13—EIGHT CHECK ANALYSES FROM SECTION OF RAIL FROM EACH BLOOM

latter being preferable. According to this plan, the circular bloom would be hot sawed on the blooming mill, as this operation would be possible while the pressure roll was being drawn back in position to remove the finished bloom from the box pass in the main roll. Therefore no time would be lost during the rolling operation. The blooms then would be transferred on a roller table direct to finishing mill.

Chemical and physical tests were made by the Lackawanna Steel Co. from experimental rails which were rolled at the plant April 1, 1920. These rails were rolled from two 12-inch x 12-inch x 5-foot 8-inch blooms, each bloom being made by the process described. A 23-inch diameter octagonal acid open-hearth ingot analyzing carbon, 0.70; silicon, 0.20; phosphor, 0.042; manganese, 0.56; and sulphur, 0.039 per cent was used for each bloom.

The report submitted by the metallurgical department to the officials of the Lackawanna Steel Co. is in part as follows:

Rolling—The two blooms were charged in pit 28, No. 1 rail mill at 11:35 a. m., April 1, 1920. The first bloom was rolled at 7:07 to 7:15; and the second at 7:16 to 7:23 p. m. into section 1000 A. S. C. E. Two rails were obtained from the first bloom, each 30 feet long, and stamped 00012-A and 00012-B; also two rails from the second bloom, the first stamped 00013-A was 30 feet long, and the second, stamped 00013-B, was 33 feet long.

Drop tests—Standard drop tests were made with an 18-foot drop on a piece cut from the top of each bloom at the hot saw. The results were as follows:

Rail	Position	Blow	Deflection	Ductility
.00012	Head up	1	1.20"	.24
		2	2.18"	.42
		3	3.10"	.63
		4	3.92"	.81
		5	4.88"	.93
		6	Broke	.95
.00013	Base up	1	1.38"	.25
		2	2.36"	.53
		3	Broke	.65

Analyses—Drillings from pieces of rail from the middle of each bloom gave results as follows, the drillings being from the upper corner of the head, and the junction of the head and web.

	Rail .00012 Position 1	Rail .00012 Position 2	Rail .00013 Position 1	Rail .00013 Position 2
Carbon	.67	.705	.67	.67
Manganese	.55	.54	.55	.52
Phosphorus	.051	.052	.05	.051
Sulphur	.04	.041	.034	.036
Silicon	—	.206*		.198*
Copper	—	.22*		.20*

*Average.

Tensile tests from these same operations gave results as follows:

TENSILE TESTS

Rail	Position	Ultimate stress	Elongation per cent in 2 inches	Reduction of area per cent
.00012	1	134,400	11.0	20.6
	2	128,400	13.0	17.0
.00013	1	125,400	12.0	20.6
	2	128,400	12.0	20.6

Fig. 11 shows the location on the rail from which the drillings for check analyses and tensile tests were taken. Fig. 4 indicates the condition of the first test piece when broken on the sixth blow and Fig. 5 shows the condition of the second test piece when broken on the third blow. After the second blow, this piece opened up in the base, the break extending through to one side of the web in an irregular tear. On the third blow, the piece broke. Both pieces showed a very clean fracture, with no sign of segregation or interior defect.

Fig. 13 shows a table of eight check analyses taken from a section of rail from each bloom. A very high degree of uniformity is shown by these analyses.

A proposed layout as would be required for the preliminary operations up to and including the straightening of the bloom is indicated in Fig. 7. Roughly, the main bay comprises four double neck heating furnaces, being of the continuous type, which are served by two floor-type manipulators which transfer the ingots from the furnaces to the 10,000-ton press. The press is equipped with sliding die base, which is fitted with three separate punches, on which the operations are alternated, allowing sufficient time for cooling.

The bloom when punched is carried by a transfer table to the adjacent bay of the building, where it is placed by another manipulator on the circular blooming mill, hot sawed, and transferred by manipulator to the straightening press. After straightening, the billet is carried on the transfer table to a three-high finishing or continuous mill, which could be part of any present installation.

New Process Necessitates Costly Equipment

By T. H. Mathias

While in Belgium in 1912 at John Cockerill's Works, I witnessed such an operation consisting of forging down an octogonal ingot about 25 inches high by 20 inches diameter. This was forged under a 10-ton hammer into a blank of pancake shape, the center of which was punched out. This operation required about 40 seconds. This flat shape was then taken over to the tire mill and rolled into a large diameter locomotive tire, which consumed about one minute of time. After this locomotive tire became cold, it was taken to a turning lathe and the entire surface was machined all over.

From this point on is where the development of the Witter process begins, the inventor has been able to see whereby the cutting of this circular flat piece of steel from the outer circle to the inner circle at any given point and straightened out into a straight bar suitable for rolling, would produce a bloom that later could be rolled into rails.

Two blooms of a 12 x 12-inch dimension made in the manner described above were rolled at the Lackawanna Steel Co. for Mr. Witter, who had them shipped in. The surfaces of these blooms showed that they were hammered or pressed after being cut away from the circular shape. This forging evidently had a good effect on the surfaces as apparently they were clean. How the surfaces of an ingot hammered down would look under inspection before being put upon the tire rim mill, I do not know, but it is my impression that they would show many fractures. These of course would be closed up to a considerable extent on the tire rim mill, due to the rolling action that they would receive.

I fail to see where rails made by this process would be any better than rails that are being manufactured today. Rail failures are practically nil from pipes or segregation.

Most failures are shown to occur from surface defects known as seams and transverse fissures. Deep etching tests of samples of rails rolled from the Witter process blooms show very seamy surfaces as may be seen from the lantern slides to be shown later on the screen. This is evidence that this method of producing blooms does not remove the seamy condition and would still require the addition of the Lakawanna Steel Co.'s method of deseaming rails to give a product free from this defect or to make a rail superior to those produced today.

The commercial side of an installation such as would be required to manufacture rails by the Witter process would involve in existing plants a sum of money equal to approximately $2,000,000 on a basis of $1,000,000 loss on the dismantling of such blooming equipment as is now used and replacing it with forging units and rim units costing at least $1,000,000. To insure an operation of 1200 tons per turn of 12 hours would require three forging machines, and three rim machines to produce this amount of tonnage. If enough money were spent in design and installation of proper units, it would be feasible to produce blooms by the annular process, at a cost equal to the blooming process as now used.

From written discussion presented at the meeting of American Iron and Steel Institute, New York, May 28, 1920. The author, T. H. Mathias, is general superintendent, Lackawanna Steel Co., Buffalo.

Holden-Kent, 607 Lincoln building, have been appointed Detroit sales agents for the Higgin Mfg. Co., Newport, Ky

Making Acid Open-Hearth Steel

Acid Is Unusually Free from Oxides and Therefore Is Adapted to Projectiles, Gun Forgings, Turbine Forgings, etc.—History of Typical Heat Is Traced and Analyses Discussed

BY B. E. L. de MARE

IN A broad sense, any steel, which in a perfectly satisfactory manner serves the purpose for which it is intended, may be considered high grade. In the narrow sense, however, in which it is here used, it may be defined as a steel which, to be accepted, must pass certain more than ordinarily severe tests, where the margin between success and failure is so narrow and the financial loss by failure so great, that the steelmaker is not only justified, but compelled, to leave nothing undone which in any possible way may improve the quality of the steel, regardless of quantity or of any reasonable increase in its cost of manufacture, in order to insure a high percentage of acceptance, when the steel is submitted to the test.

The more important products of acid open-hearth steel, manufactured by the Midvale Steel & Ordnance Co., are as follows:

Armor piercing projectiles; gun forgings, especially of large caliber; large or intricate forgings, such as marine crank shafts and connecting rods, bucket wheels and pinion shafts for steam turbines, and other forgings, in which transverse strength is required; forgings which require a hard and polished surface without flaw or blemish, such as hardened rolls; special grades of bar steel; and locomotive and car wheel tires.

Comparatively Free of Oxides

That acid open-hearth steel is superior to basic for forgings depending on transverse test bars for their acceptance, has been repeatedly proven, not only by our own experience, but by that of many others in this country as well as in England and France. The reason for this is that the quality of the steel is measured by its freedom from oxides, and that acid open-hearth steel is more free from these oxides than basic steel, because acid open-hearth slag is more effective than basic slag by its reactions with the steel to deoxidize it. Of course, there is no open-hearth steel, acid or basic, absolutely free from oxides, nor is there any other steel, no matter by what process made, which under the microscope does not show oxide spots.

Therefore, oxidation is only a matter of degree, and the various processes overlap, so that a badly melted steel, by whatever process produced, may be worse than a well melted steel produced by any of the other processes. Therefore, when the claim is made that acid open-hearth steel is better than basic, this holds good only insofar as full advantage has been taken of the fact just mentioned in regard to acid slag as compared with basic.

Figs. 2 and 3 show two designs of

From a paper presented at the meeting of the American Iron and Steel Institute, New York, May 28, 1920. The author, B. E. L. de Mare, is superintendent of open-hearth, electric and crucible furnace plants at the Nicetown works of the Midvale Steel & Ordnance Co.

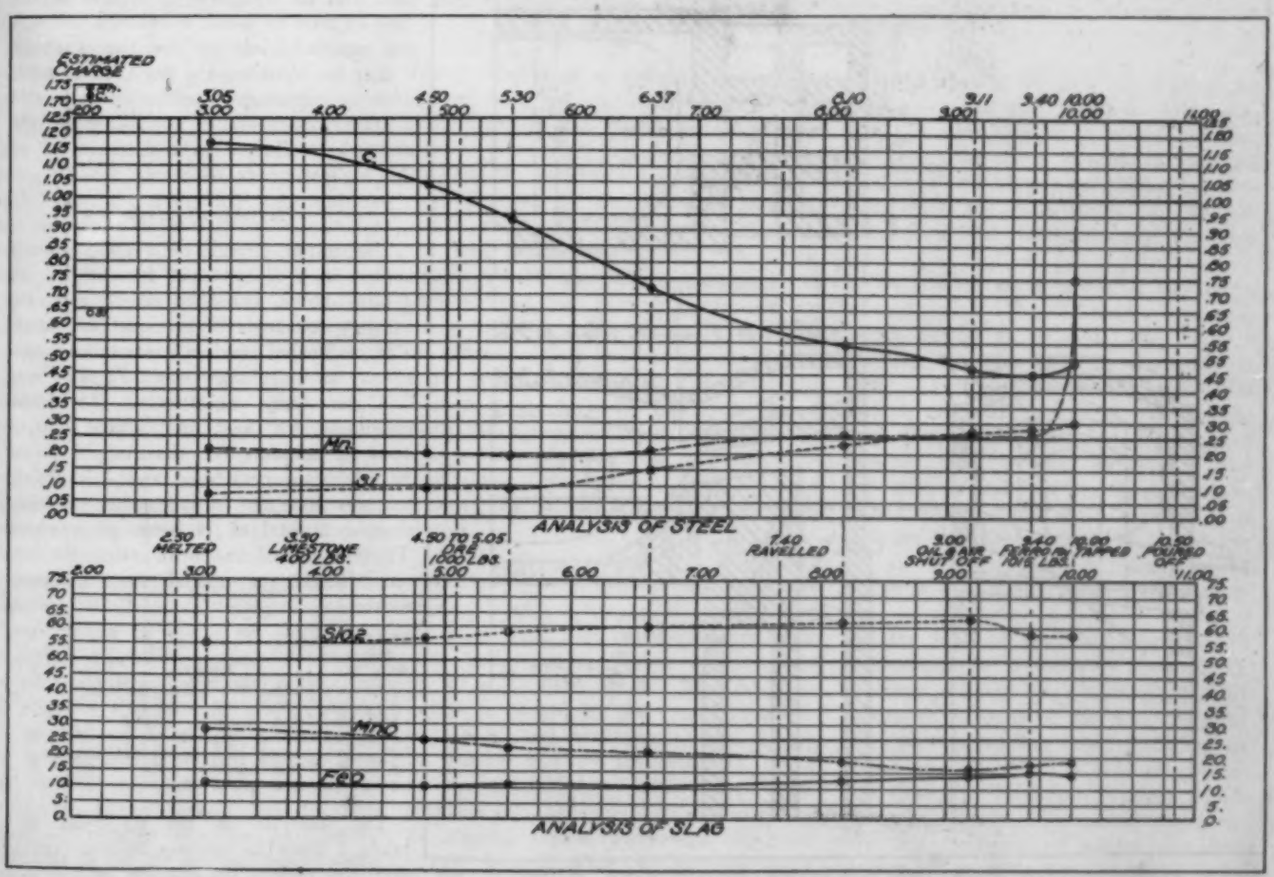


FIG. 1—GRAPHICAL ANALYSIS CHART OF HEAT OF ACID OPEN-HEARTH STEEL FOR STEAM TURBINE BUCKET WHEELS

open-hearth furnaces, one as adapted for producer gas and the other for fuel oil. The nominal capacity of each is 50 tons, although charges up to 140,000 pounds may be melted. There is nothing peculiar in the designs, as far as valves, flues, regenerative chambers or stacks are concerned, and these parts are therefore not shown. The only unusual feature is the great height of the furnace roof over the door sill level. This has been a gradual development, and has been found advantageous on account of the high and long-sustained temperature necessary to carry out the chemical reactions during the deoxidizing period of the process. The high roof provides a large combustion chamber, which permits a full and free development of the flame, and at the same time avoids damage by the intense heat to the roof and walls of the hearth. Even so it is advisable with a new furnace to keep it working a few weeks on the less exacting grades of steel, such as tires and bar steel, in order to harden it before turning it over on the higher grades, as not even the best quality of silicon brick will stand at the beginning the high temperature required for these. Toward the end of its life, the furnace as a general rule has again to be put back on lower grades of steel as on account of impaired condition of checkers and draft it is no longer sharp enough for making high grade steel.

Water Cooling Not Employed

No water-cooled devices of any kind are used in the walls, roof or ports of the furnace, as it has been found as a result of many trials that even when used to a very limited extent, their cooling effect interferes with the sharp working of the furnace. The only water-cooled parts used are the charging doors, as they are far enough removed from the interior, not to have a noticeable effect on the heat.

It may be of interest to give here a comparison between the life of acid and basic open-hearth furnaces, when melting with producer gas as well as with fuel oil, as measured by the average number of months from the time of charging the first heat after a general repair, until the time of tapping the last heat before the next general repair. The average number of months is given, rather than the average number of heats, on account of the great variety of heats made, some requiring twice as long a time as others, and is based on records for the last five years. The average life of basic furnaces on producer gas was 9.1 months; and on fuel oil, 10.7 months. The average life of acid furnaces on producer gas was 11.2 months and on fuel oil, 12.6 months.

In comparing producer gas and oil, steel can be made with one as well as with the other. Oil is more oxidizing than gas and, therefore, requires a greater proportion of pig iron in the first charge and a higher temperature after the heat is melted to settle up to the metal. On the other hand, oil cuts down the repair cost, requires fewer men per furnace, increases the production, permits better control of temperature, and extends that part of the life of the furnace, which is available for making high grade steel, almost to the very end, as the direction of its flame is controlled from the outside, and it is less affected by the condition of checkers and draft for generating a high temperature. Taking it all in all, oil is, therefore, to be preferred as long as its price is not prohibitive.

The analytical description of a heat of high grade acid open-hearth steel shown graphically in Fig. 1, was made for steam turbine bucket wheels, which require tangential strength, and therefore, their acceptance depends on physical properties as shown by tangential test bars. Hence, high grade acid open-hearth steel is used for their manufacture. It is a simple heat of plain carbon steel and its treatment is typical of the class of steel to which it belongs. Though not especially selected for this analysis, it may be considered a good, clean heat, without unnecessary complications and is therefore suitable to illustrate the principles followed in the treatment of the highest grade of steel.

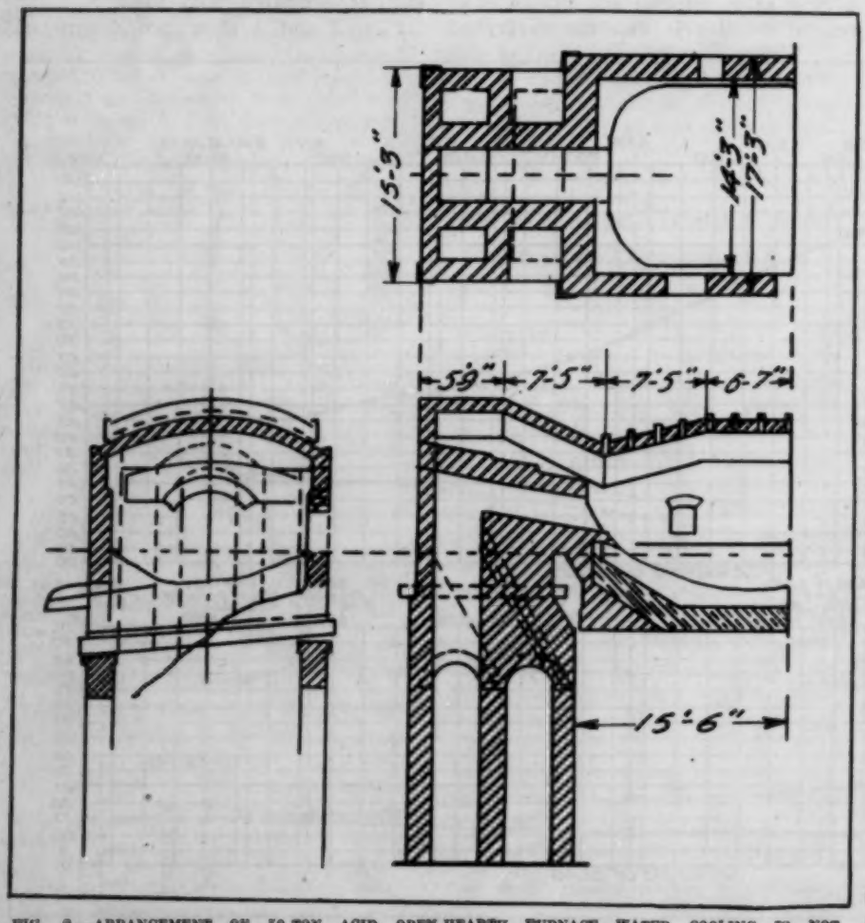


FIG. 2.—ARRANGEMENT OF 50-TON ACID OPEN-HEARTH FURNACE—WATER COOLING IS NOT PROVIDED

History of Heat

The initial charge of 141,000 pounds melted in a 50-ton acid furnace of the design shown, consisted of 35 per cent of pig iron and 65 per cent of scrap. The estimated carbon, manganese and silicon in the charge was 1.72, 1.74 and 0.64 per cent, respectively. The time consumed for heat in furnace was 1 hour 45 minutes for charging, 5 hours 50 minutes for melting, and 7 hours 10 minutes time in furnace after melting, making a total of 14 hours 45 minutes. The history of the heat, after the initial charge was melted, may be summarized:

Time After Melted		Remarks
Hr.	Min.	
1	0	Added 400 pounds limestone.
2	0	Added 1000 pounds iron ore.
4	50	Bath thoroughly rabbled.
6	10	Oil air shut off.
6	50	Added 1015 pounds ferromanganese.
7	10	Heat tapped.
8	0	Heat poured off.

The analysis of the go-ahead test, taken 1 hour 10 minutes before tapping and the carbon, manganese and silicon obtained from 1015 pounds of ferro-

manganese added 20 minutes before tapping, was as follows:

	C.	Mn.	Si.
Analysis of go-ahead test.....	.49	.27	.24*
Addition of ferro.....	.05	.57	.01
Total	.54	.84	.25

*Judged by fracture.

The table below shows the chemical composition of the heat as aimed at, and as obtained:

	Aimed at	Obtained
Carbon	.50	.49
Manganese	.65	.68
Phosphorus	.050	.036
Sulphur	.050	.038
Silicon	.25	.27

On account of the high percentage of Mn in the initial charge the slag remained greenish yellow in color from the time the heat was melted until it was tapped, with only slight variations in shade.

The steel was poured into 23-inch molds, nine ingots each weighing 10,500 pounds, and three about 11,400 pounds each. After cooling the ingots were sent to the machine shop to be sliced into blocks, and these blocks were then forged under a steam hammer into bucket wheels for steam turbines.

To facilitate the analytical description of this heat, a graphical analysis chart has been plotted and drawn, showing its chemistry from the time it was melted at 2:50 a. m. until it was tapped at 10:00 a. m.

Eight Tests Taken

Eight breaking tests were taken at various times and poured into a standard test mold, about 2 inches deep by 2 inches wide by 6 inches long. These tests were broken and each fracture photographed. At the same time other tests were taken, both of steel and slag for chemical analysis. The steel tests were analyzed for carbon, manganese and silicon and by plotting these determinations on the "analysis of steel" chart, curves were obtained showing the changes in these elements.

The slag tests were analyzed for SiO_2, MnO, FeO, Fe_2O_3, CaO, MgO, Cr_2O_3 and Al_2O_3, but to avoid confusion only the three most important of these oxides, SiO_2, MnO and FeO were plotted on the "Analysis of Slag" chart.

Commencing with test No. 1, taken at 3:05 a. m., or 15 minutes after the heat was melted, its analysis shows the oxidation of carbon, manganese and silicon during the time of melting by comparing it with the estimated percentage of these three elements in the initial charge. Carbon has dropped from 1.72 to 1.17 per cent; manganese from 1.74 to 0.21 per cent, and silicon from 0.64 to 0.07 per cent. A considerable percentage of manganese in the first charge is highly desirable, because by its oxidation during the melting it gives a clean slag, greenish yellow in color, almost from the start and if the pig iron does not contain enough manganese this deficit is made up for high grade steel by the addition of ferromanganese to the initial charge.

Adding Iron Ore

Care is now necessary in the addition of iron ore for decarburizing the metal, as this is an endothermic reaction, absorbing heat and requiring a high degree of temperature for a vigorous reaction between the oxygen of the ore and the carbon of the steel. If the addition of ore is made too soon, or in too large a quantity, its chilling effect may so retard this reaction that when finally the high temperature required is reached, and the bath goes into a boil, this will carry the decarburization so far that by the time the bath is well settled up, the carbon in the steel is well below the carbon aimed at. This would necessitate additions of spiegel and pig iron in order to recarburize the heat. Such a condition is almost fatal to the production of high grade steel, because the lower the carbon in the go-ahead test as compared with the carbon aimed at, and therefore the greater the addition of recarburizing finals, the greater will be the amount of silicate of manganese produced.

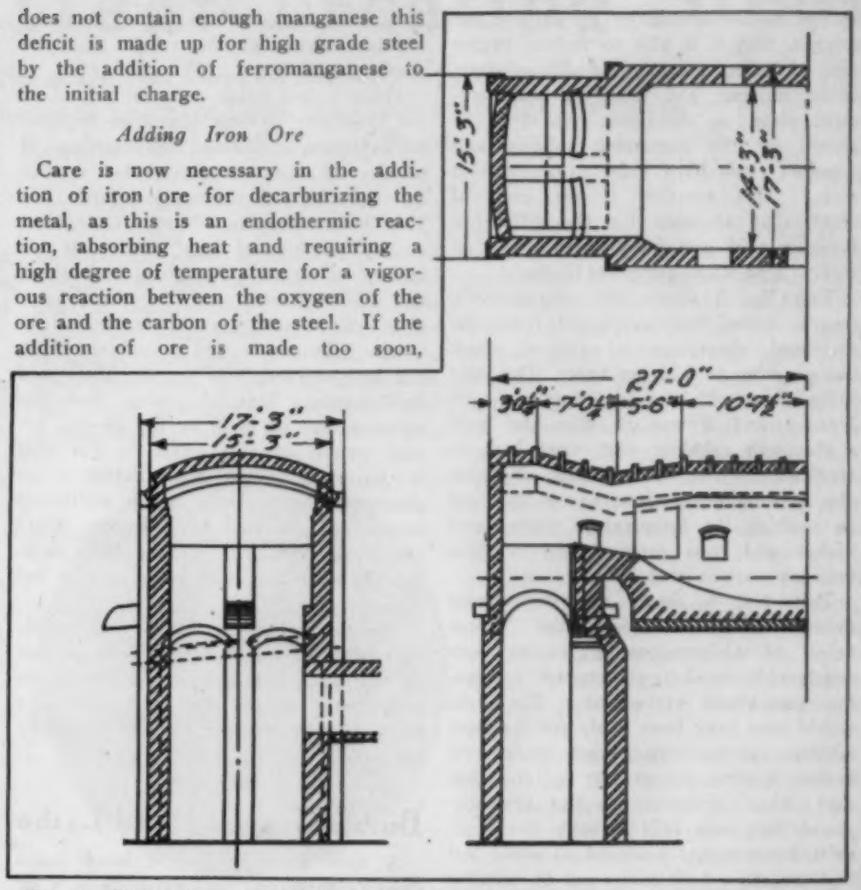


FIG. 3—GREAT HEIGHT OF FURNACE ROOF OVER DOOR SILL LEVEL IS FEATURE OF THIS 50-TON OPEN HEARTH

At the end of these first two hours test No. 2 was taken. This shows the oxidation of the carbon, slow at first on account of lack in temperature, now well under way. There having been as yet no addition of iron ore, this oxidation is caused by the rust in the initial charge, by oxidation of the charge in melting and by the oxidizing effect of the flame itself. The higher temperature of the slag is also shown by its slightly higher percentage of SiO_2.

Test No. 3, taken 40 minutes after No. 2, shows the oxidation still going at the same rate, due to the addition of 1000 pounds of iron ore during the interval. The only effect of this addition on the slag is a slight increase in FeO, the SiO_2 continuing to rise and the MnO slowly decreasing by dilution with the SiO_2 taken up by the slag from the bottom along the slag line.

Test No. 4, taken one hour and seven minutes after No. 3, shows the oxidizing period at an end. The SiO_2 in the slag has now gone up from 55 per cent 15 minutes after the heat was melted, to 60.7 per cent. While the two chief bases, MnO and FeO, have dropped from a total of 39.1 to 31.8 per cent, in spite of the lower carbon in the steel. But most marked, and showing that the deoxidizing period has set in, is the increased percentage of silicon in the steel, caused by the reaction between the carbon of the steel and the SiO_2 of the slag, according to the formula, $2C + SiO_2 = Si + 2\,CO$. Whereas during the melting of the charge on account of the low temperature then prevailing, the oxidation of silicon was going on at a much greater rate than the oxidation of the carbon, with the steadily increasing temperature this oxidation of silicon was first checked, then held, until finally a complete reversal has taken place, the very high temperature now reached having

so increased the affinity of carbon for oxygen, that it is able to reduce silicon out of SiO_2, leaving the silicon free, in its nascent, and therefore most efficient state, to deoxidize the steel, as shown by the increasing solidity and freedom from blow holes of subsequent tests. This reaction is the essential point, that accounts for the difference between acid and basic steel, and that makes acid steel superior to basic.

Test No. 5 shows the characteristic "worm holes" well developed from the increased absorption of silicon which has gone up to 0.23 per cent. The only thing done with the heat between tests Nos. 4 and 5 was to give the bath a thorough rabbling with steel bars to facilitate the liberation of gas. Nothing else is now being done except to keep on pushing the temperature higher and higher and thus promote the reaction between carbon and SiO_2.

Test No. 6 shows the deoxidizing process almost complete, the "worm holes" of the previous test having been nearly obliterated by the steadily increasing percentage of silicon. The heat would now have been ready for the final addition of ferromanganese made just before tapping, except for the fact that the carbon according to the first go-ahead test, was still a little too high, or 0.53 per cent. A second go-ahead test had therefore been taken out 10 minutes ahead of test No. 6, and on this being reported as being down to 0.49 per cent carbon the ferromanganese was added at 9:40 a. m., and the heat tapped at 10:00 a. m., or 20 minutes later.

Test No. 7, taken just before adding the ferromanganese, is very little different in appearance from test No. 6, while test No. 8, taken after the addition of ferromanganese, and just before tapping the heat, is absolutely solid. The silicon in this test was 0.30 per cent, while the silicon in the heat-test, taken while pouring the steel into the molds, was 0.27 per cent, which shows that the silicon in the steel while still in the furnace, is higher in the stratum close to the slag, from which test No. 8 was taken, and where the reduction of silicon from the slag is taking place, than the average silicon of the whole mass of steel.

There is one more point in regard to the chemistry of this heat that requires an explanation; that is, the shutting off of the oil and air which also implies the lowering of the stack-damper one hour before tapping. It may be noticed on the "Analysis of Steel" chart that this had no effect on the carbon, manganese and silicon curves. On the chart, however, the result was a sudden drop in the SiO_2 curve, and a corresponding, but less marked, rise in the MnO and FeO curves. This of course does not mean a loss of SiO_2 as far as the actual weight of this oxide in the slag is concerned. What has occurred is an absorption by the slag of an additional amount of the two basic oxides, MnO and FeO, from some source, thus making the slag less acid than it was before.

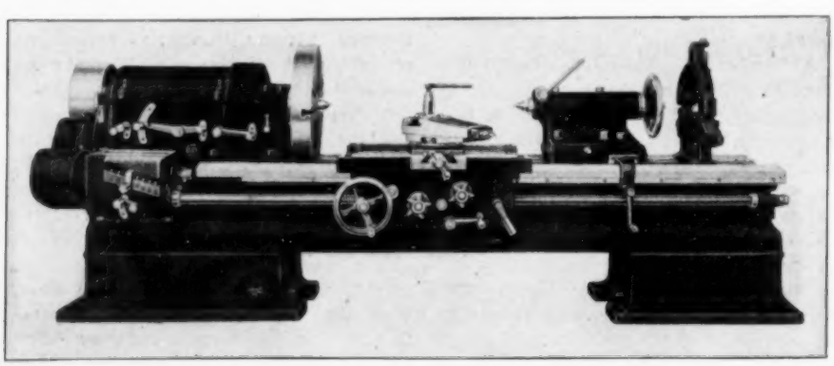
The thermal effect was a very decided cooling of the slag, while, on account of slag being a poor heat conductor, the temperature of the steel underneath the slag was by comparison only slightly lowered.

Builds Geared Head Lathe

A new 26-inch geared head lathe driven through an expanding ring friction clutch upon which the driving pulley is mounted, has been developed by the Betts Machine Co., Rochester, N. Y. The clutch is operated from the apron at a point always convenient to the operator. The same movement which disengages the clutch automatically applies the friction brake, thereby stopping the machine quickly.

There are nine spindle speeds in geometric progression, the speed box being of the selective type with three direct speeds. Any desired speed is obtained quickly by convenient levers in front of the head stock, which is of the all-geared, enclosed type. The speed changes are made through hardened steel sliding gears and positive clutches running in oil. The teeth of the sliding gears are rounded to allow for easy engagement and the gears are arranged so that no two sets can be engaged at the same time. All shafts and gears are located in the lower half of the base of the headstock, thereby allowing easy access to all of the parts, it being only necessary to remove the cover.

The shaft bearings are bronze bushed and lubrication to the bearings is provided by means of the splash and chain oil system. When the lathe is arranged for electric drive, the motor is mounted on top of the headstock cover and connected through gearing to the main driving shaft.



POWER IS DELIVERED TO THIS 26-INCH GEARED HEAD LATHE THROUGH AN EXPANDING RING FRICTION CLUTCH

Buys Idle Railroad

The Hyman Michaels Co., Chicago, has bought at auction sale in the United States court at Grand Rapids the property of the Michigan East & West railroad, 75 miles long, from Manistee to Marion, Mich. The road was owned by the William T. Joyce Co., of Chicago, lumbermen, and has not been in operation since January, 1919. Residents along the road have expressed a desire to buy sections for the purpose of continuing operation and 30 days has been allowed them to exercise an option. In case they do not, the road will be dismantled and sold by the new owners. The price was somewhat in excess of $350,000. Included in the purchase are 10,000 tons of standard steel rails, mostly 60-pound, with some 56-pound, three locomotives and 15 cars.

Stanley Baldwin, member of parliament for the Bewdley division of Worcestershire, who is the head of Baldwins, Ltd., one of the most important of British steel syndicates, speaking at Worcester on March 6, reviewed the trade conditions of the world, pointing out that there is a shortage not only of food but of other necessaries of civilization. He said that never before in the history of the world had other countries so looked to England for a lead, and so leaned on England for financial and moral support.

"If Englishmen fail," he declared, "they will bring down with them the whole of Europe. The omens are more favorable than anyone with any knowledge of affairs could have anticipated a year ago. The financial and labor situations are better than they were.

Effect of Heat Treating Steel

Physical Properties of Steel Do Not Depend Entirely Upon the Relative Proportions of Microconstituents but Also Upon the Fineness of the Structure—Results of Heat Treating Steel

BY ALBERT SAUVEUR

IT WOULD be difficult to find a contribution written within the last 10 years in any of our technical transactions on the subject of the heat treatment of steel which is not based in part and often chiefly, if not wholly, on the teaching of the microscope. The reason for this is obvious. If the heat treatment of steel is of such vastly greater importance and significance than the heat treatment of any other metal or alloy, if it implies a vastly greater number of possible treatments and of possible results, it is because steel, unlike other metals and alloys, undergoes on cooling (and, on heating) considerably below its melting point, momentous transformations which it is possible, at will, to arrest at any desired stage, thereby conferring to the metal an almost infinite number of combinations of physical properties to meet our requirements. Were it not for the microscope we would be in almost complete darkness as to the nature of these transformations and as to the extent to which a given treatment has permitted them to proceed.

The diagram, Fig. 1, may help in visualizing these transformations as well as the results obtained by various heat treatments. For the sake of simplicity the steel considered is assumed to be of eutectoid composition, that is, to contain in the vicinity of 0.85 per cent carbon and free, therefore, from excess ferrite or cementite. It is well known that when such a steel is allowed to cool slowly it exhibits a marked thermal critical point at about 700 degrees Cent.,

FIG. 2—MICROGRAPH OF MARTENSITE

resulting from a spontaneous evolution of heat at that temperature, and it is also well known that on cooling through its critical point this steel, which at higher temperature consisted of a solid solution of carbon in iron (austenite), is now converted into an aggregate of iron (ferrite) and the carbide of iron Fe_3C (cementite) the resulting intimate mechanical mixture of these two components being called "pearlite."

Austenite, however, is not abruptly converted into pearlite on reaching its critical point. The transformation is gradual, three stages at least being recognized as marking as many steps in the transformation. These stages correspond to readily distinguishable structures. They are often referred to as transition constituents, and are called respectively martensite, troostite and sorbite. This gradual transformation of austenite into pearlite is depicted in Fig. 1. If the cooling be sufficiently slow, the transformation is complete and the steel becomes pearlitic, a condition which imparts to it maximum softness and ductility and minimum tenacity.

By hastening and regulating the rate of cooling it is possible to prevent the full transformation of the steel; indeed it is possible to arrest that transformation at any desired stage in accordance with the set of physical properties desired. This partial suppression of the transformation is made possible by the lowering of the critical point, that is, of the temperature at which the transformation takes place.

In other words the faster the cooling the lower the temperature of transformation, and the lower that temperature the more incomplete the transformation. If by the rapid cooling involved in

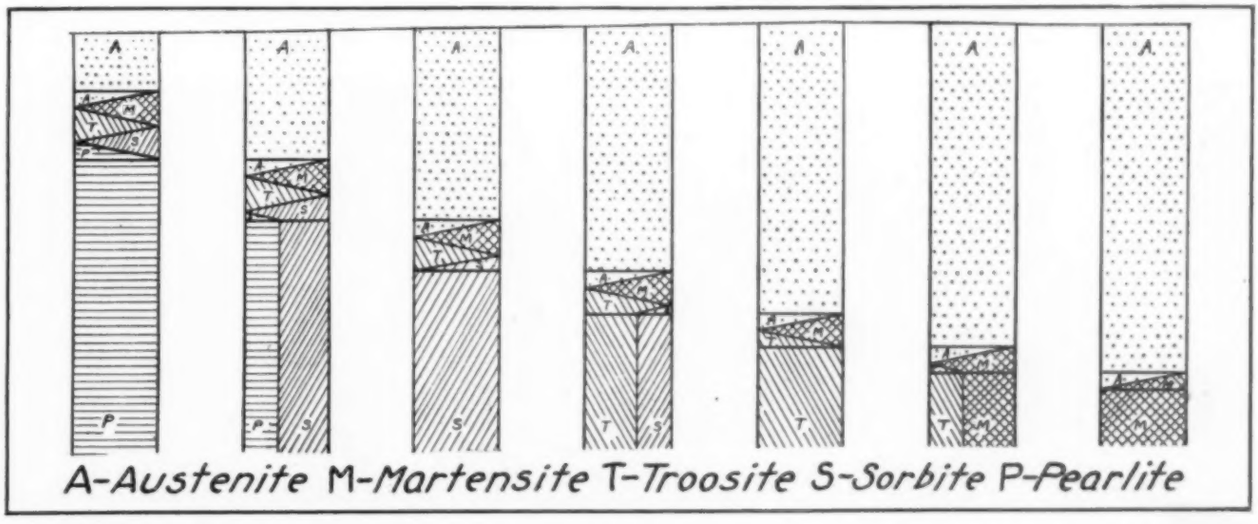


FIG. 1—DIAGRAM SHOWING THE RESULTS OBTAINED BY VARIOUS HEAT TREATMENTS. THE STEEL IS ASSUMED TO BE OF EUTECTOID COMPOSITION

Abstract of a paper presented at the spring meeting of the American Iron & Steel institute, New York. The author, Albert Sauveur, is professor of metallurgy, Harvard university.

quenching steel the critical temperature remained at 700 degrees Cent. the steel would become pearlitic, and the hardening of steel therefore would not be possible. Quenching steel for hardening, however, lowers the transformation temperature to about 300 degrees Cent and at that low temperature it is possible for austenite to be converted into martensite only. The transformation is then arrested, the steel remains martensitic, and hence becomes intensely hard. It has been attempted to indicate in Fig. 1 the influence of the rate of cooling on the position of the temperature of transformation, and the influence of the position of the temperature of transformation on the amount of transformation taking place. The critical point has been represented in each case by a set of two parallel horizontal lines (*P*) in order to make it possible to indicate the progress of the transformation as the metal cools through this point. Seven rates of cooling are shown yielding, respectively, pearlite, pearlitio-sorbite, sorbite, sorbito-troostite, troostite, troostito-martensite, and martensite. It is well known that it is not possible to prevent altogether the transformation of carbon steel, that is, to retain it in its austenitic condition, the fastest rate of cooling producing martensite.

From the teaching of the diagram of Fig. 1, we naturally infer that in order to produce pearlitio-sorbitic steel the metal should be cooled at such a rate as to lower its critical point to about 625 degrees Cent., while to obtain sorbitic, sorbito-troostitic, troostitic, troosto-martensitic or martensitic steel, the cooling of the metal should be conducted with increasing rapidity.

It should be borne in mind, however, that while it is known that when the transformation takes place at 700 degrees Cent. the steel becomes pearlitic, whereas with its transformation lowered to 300 degrees Cent. it becomes martensitic, it is not claimed that the temperature

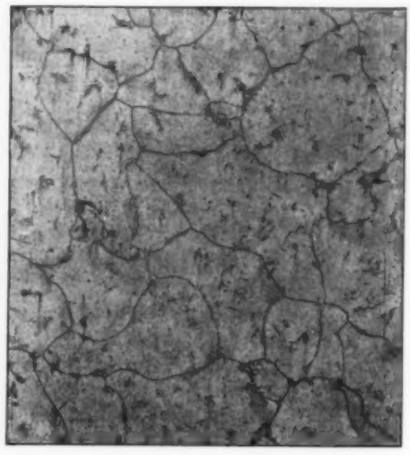


FIG. 4—MICROGRAPH OF AUSTENITE

of transformation corresponding to the various structures described are accurately indicated in the diagram and that for obvious reasons the aim is to depict the mechanism of the critical transformation of steel and the relation existing between the three factors: rate of cooling, position of the transformation temperature and degree of transformation.

Sorbite is more tenacious, harder and less ductile than pearlite; troostite is more tenacious, harder and less ductile than sorbite; martensite is more tenacious, harder and less ductile than troostite. When maximum softness and ductility are needed, therefore, the treatment should be of such a nature as to permit the steel to become pearlitic which in turn implies a transformation at about 700 degrees Cent; hence, slow cooling. Such treatment is generally known as annealing.

To produce greater tenacity and elastic limit with reduced ductility although retaining freedom from brittleness, the metal should be made sorbitic through a suitable rate of cooling, by which position of the critical point will be sufficiently depressed to accomplish the change.

To produce great hardness, necessarily accompanied by little ductility, if not by brittleness, the steel should be made martensitic or troostitio-martensitic, which implies cooling at such rate that the temperature of transformation is lowered to about 300 degrees Cent. These three basic treatments may be called respectively softening, strengthening and hardening treatments. It is obvious that the gradual transformation of one constituent into another, as for instance, of martensite into troostite may result in the presence in the metal of these two constituents in an infinite number of proportions, hence that the physical properties of steel may be made to vary by an infinite number of steps.

The physical properties of steel, however, do not depend exclusively upon the relative proportions it may contain of the microconstituents mentioned previously; they also depend upon what may be termed "the fineness of the structure." In other words steel may be finely or coarsely pearlitic, finely or coarsely sorbitic or martesitic, when it will be found in nearly every case that the finer structure is preferable. Hence, the desirability of producing not only the necessary constituents but of obtaining them in the finest possible form. This is why steel should not generally be heated to a temperature much above its critical range. Again, in steel so generally, although vaguely, described as "heat treated," the aim is to produce a sorbitic condition in order that the metal may be highly tenacious, but this condition is not as a rule imparted by a single cooling through the range at the proper rate because such treatment while producing sorbite will not yield it in a sufficiently fine condition. It is preferable to have recourse to an indirect treatment consisting in first producing martensite through a faster cooling and then in transforming that constituent into sorbite by a socalled "drawing treatment," because the fast cooling needed to produce martensite implies a

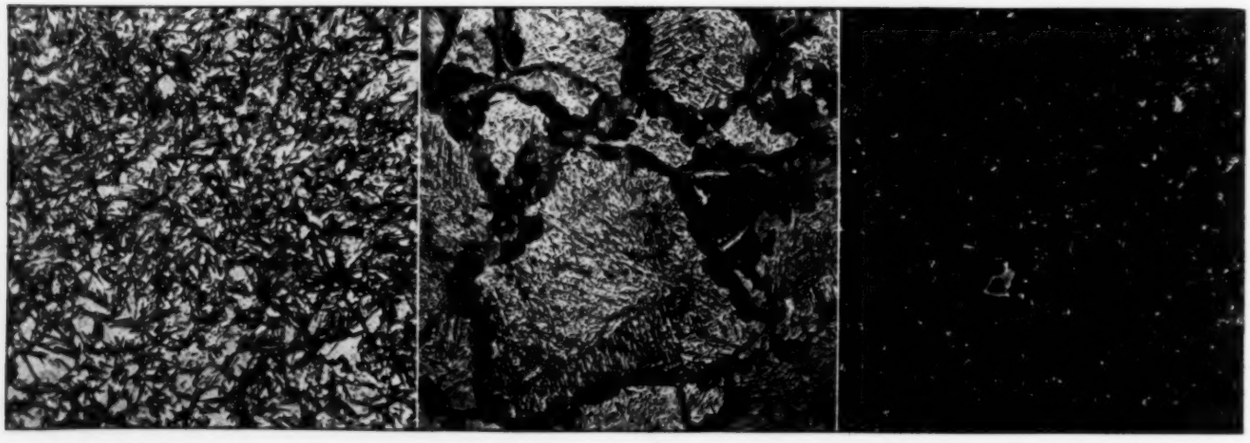


FIG. 3—MICROGRAPH OF AUSTENITE AND MARTENSITE. FIG. 5—MICROGRAPH OF MARTENSITE AND TROOSTITE. FIG. 6—MICROGRAPH OF TROOSTITE

finer structure and this fineness of structure is retained when martensite is tempered into sorbite.

Passing now to alloy steels, metallographic methods of investigation again supply the key necessary to understand the remarkable properties of some of these alloys and the influence of heat treatment. It has been found that some elements such as manganese, nickel chromium, tungsten and others when alloyed with iron and carbon yield results to which these alloys owe their great industrial importance. It may be asserted that were it not for the marked influence of these elements in lowering (or raising) the position of the temperature of transformation they would have comparatively little, if any, influence on the physical properties, and alloy steel, therefore, would be of little importance. If manganese steel, for instance, had its transformation temperature on slow cooling at the ordinary temperature, that is, in the vicinity of 700 degrees Cent., the steel would become pearlitic on slow cooling and would not, therefore, differ materially from ordinary slowly cooled carbon steel. Manganese, however, lowers the point of transformation causing that transformation to take place at gradually lower temperatures and therefore causing the steel to assume on slow cooling the various structures described previously and which in carbon steel can be obtained only, if at all, by increasing the rate of cooling. When for instance, a sufficient proportion of manganese or nickel has been introduced to lower the temperature of transformation to some 300 degrees Cent., the steel, although slowly cooled, becomes martensitic. Indeed with some of these elements it is possible to prevent the transformation altogether retaining the steel in its austenitic condition. Obviously in such cases no thermal critical point occurs above room temperature. The influence of some of these alloying elements, therefore, is to produce after slow cooling, structures which in carbon

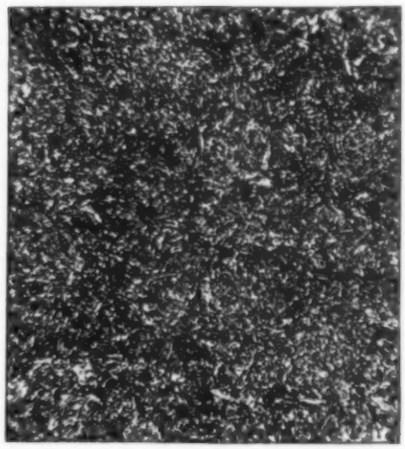


FIG. 8—MICROGRAPH OF SORBITE

steels can be obtained only by rapid cooling (quenching), if at all. The advantage of obtaining sorbitic or martensitic structures without having recourse to quick cooling is obvious because of the inherent dangers of the quenching bath.

To clarify, steel to become martensitic must have its transformation lowered to some 300 degrees Cent. This can be accomplished in carbon steel (provided enough carbon be present) by quenching, while in some alloy steels it is produced through the addition of a sufficient amount of the special element without the necessity of quenching. Such steels are frequently referred to as air or self-hardening steels.

A third factor is sometimes effective in lowering the temperature of transformation sufficiently to produce martensite, namely, increasing the temperature from which cooling begins. Some nickel chromium steels, for instance, which after slow cooling from a temperature slightly above the normal position of their critical point, are pearlitic or sorbitic, may become martensitic if the cooling proceeds from a considerably higher temperature. It is observed then that as the temperature from which cooling begins increases, the position of the critical point is lowered until when it reaches some 300 degrees Cent., martensite is produced. In some cases the normal thermal critical point occurring in the vicinity of 700 degrees Cent., on slow cooling from slightly above the critical range seems to gradually disappear as the temperature from which cooling begins increases, while a new point occurs in the vicinity of 300 degrees Cent., increasing somewhat in intensity as the temperature from which the metal cools increases. This is what happens in the heat treatment of high-speed steel. It remains true, however, that steel becomes martensitic whenever the temperature of transformation is lowered to about 300 degrees Cent., whether this be accomplished by quenching or through the influence of the special element or elements assisted or not by increasing the temperature from which cooling begins.

In regard to the formation of martensite, steels therefore may be divided into the following classes:

Water Hardening Steel, that is, those steels which in order to become hard must be quenched in water as for instance, medium high carbon steels.

Oil Hardening Steel, that is, those steels which become hard after quenching in oil as for instance high-carbon steels.

Air Hardening Steel, that is, those steels which become hard after air cooling as for instance, some nickel chromium steels, some nickel steels, some manganese steels, etc.

Furnace Hardening Steel, that is, those steels which become hard even after slow cooling in the furnace as for instance, some nickel and some manganese steels.

The question may well be asked, however, whether the martensite formed under these different cooling conditions should be identical in structure and physical properties seeing that this constituent may have formed quickly in

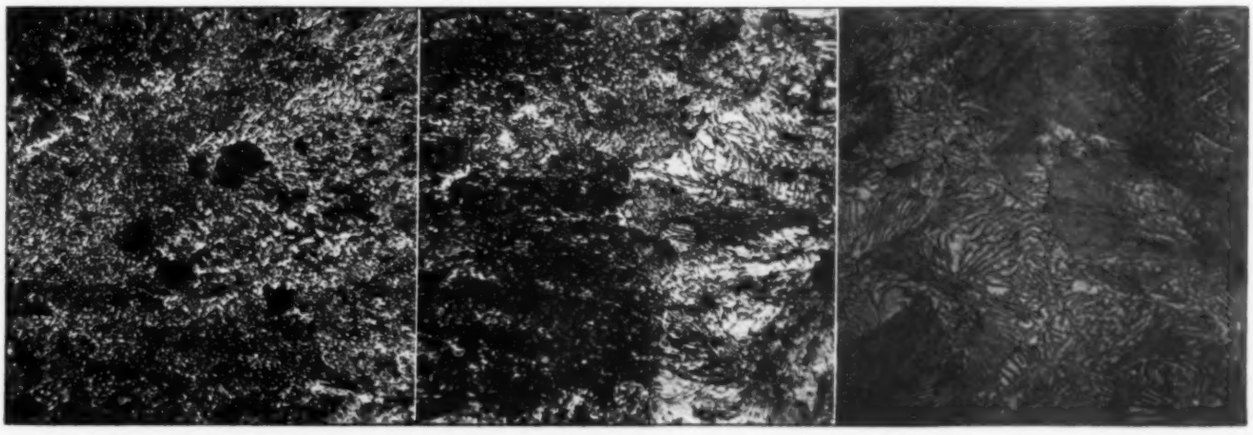


FIG. 7—MICROGRAPH OF TROOSTITE AND SORBITE. FIG. 9—MICROGRAPH OF SORBITE AND PEARLITE. FIG. 10—MICROGRAPH OF PEARLITE

water quenching, more leisurely on air hardening, or leisurely on furnace cooling. Indeed it is apparent that martensite produced on slow cooling is more stable than the same constituent obtained by rapid cooling. Carbon steel, for instance, made martensitic by quenching can be readily tempered and softened while self-hardening steel made martensitic by slower cooling requires prolonged heating to some 600 to 675 degrees Cent., to be softened. This is why some of these self-or-air-hardening steels were used successfully as cutting tools before the introduction of high-speed steel. They could be used at greater speed than quenched carbon steel without losing their cutting edge through the tempering action of the heat of friction. Their martensitic condition was more stable. Furnace hardening steels which become martensitic after furnace cooling should retain their cutting edge when heated to still higher temperature and should therefore possess some of the essential properties of high-speed steel. Obviously then the condition of any hardened steel is the more unstable, that is, it yields the more readily to tempering and drawing, not only the more incomplete its transformation but also the faster the cooling that produced this partial transformation. To illustrate, martensitic carbon steel is more unstable than the same steel in a troostitic condition because it is less completely transformed—martensitic air hardening steel is more stable than martensitic carbon steel because the martensite of the air-hardening metal resulted from a materially slower rate of cooling.

Nation Must Seek Foreign Oil Fields

BY GEORGE OTIS SMITH

IN the chronology of industry the last 10 years might fitly be called the petroleum decade. Ten years ago the wells of the United States were adding to our reserve stocks 15,000,000 barrels a year, but in the last nine months our stored petroleum has been drawn upon to the extent of 15,000,000 barrels. In 1910 our imports of oil were an insignificant item, but in 1919 we were obliged to import nearly 47,000,000 barrels of crude oil more than we exported. Ten years ago Mexico was our customer for crude oil as well as for refinery products, but now we realize too keenly our dependence upon the Mexican wells.

In terms of oil, then, the decade 1910-1919 is best described as a transition from oversupply to overdemand. Figures already available indicate that in both production and consumption the present year promises a record that will further emphasize this discordance between supply and demand. The first three months of 1920 have established a rate of domestic production that if unchecked will mean a total for the year of 415,000,000 barrels, or nearly twice the output of 1910, and a rate of consumption that would make the year's requirements more than 490,000,000 barrels, or one-seventh more than last year's consumption.

Future Holds Little Promise

The response that the petroleum industry has made to the pull of demand during the last few months may be taken by optimists as a measure of what we can expect in the future. An intensive drilling campaign has been the practical response to high prices for crude oil, but even the most wisely directed drilling can give only temporary relief; energetic pushing upward of the production curve only hastens the coming of the year when that curve must turn downward.

Using within our own borders fully half of the world's annual production of petroleum, we seem to possess only about one-seventh of what remains. In the past 10 years our coal mines have contributed 41 per cent of the world's output of coal. Our present estimates credit the United States with more than half of the world's coal reserves, so that if we are to think in world terms, the great tonnage of coal produced by this country each year represents less than our national share. In these same 10 years our oil wells have poured forth more than 61 per cent of the world's output, although we now believe that the United States possesses only about 12 per cent of the oil left to the world for its future use, so that in oil our nation is doing far more than its share.

Various Petroleum Substitutes

When we come to consider substitutes for petroleum products, the capacity of your own steel industry for furnishing benzol and alcohol as by-products deserves first mention. I am informed that plants now in operation and under construction have a capacity of 95,000,000 gallons a year—that is, if the output of light oils is converted into motor benzol. Such an annual contribution of less than 2,000,000 barrels, however, is equivalent to not much more than a week's output of gasoline as the refineries of the United States are now running. It must be recognized, however, that this country, as the world's greatest consumer of coal, has not fairly begun by-product recovery.

The oil-shale resources of our country must not be overlooked nor their national value underestimated as a rear line of economic defense. As their oil content is fairly comparable with the petroleum reserves of the world, these shales furnish an effective guaranty against the United States going bone-dry as to oil, but the oil won from oil shales will not be labor-cheap like the petroleum now flowing from our wells.

Prices also will eventually exert an automatic control on the use of oil products. High prices are here for crude oil and for every one of its products, and high prices will help to bring about a kind of economic survival. The more essential use of oil—that is, the use of oil where it serves the greatest end—will survive, and business practice, public opinion, and even, if needed, governmental regulation, should work together to enforce obedience to this democratic rule of the greatest good to the greatest number.

The use of fuel oil as a substitute for coal must be discouraged, for our navy and our merchant marine need the fluid fuel for reasons that do not apply to stationary boilers or even steam locomotives. On terra firma a power program can be worked out that will hitch up coal mine and water fall efficiently, and both industry and transportation can be fully electrified to the end that except perhaps on the Pacific coast, not a barrel of oil should be used under boilers.

Significance of Foreign Fields

This need for oil to insure our industrial life inspires the call for pioneering on other continents by American oil companies. In the world estimates, we credit South America with a third more oil reserves than the United States, so that one guidepost for the explorer and developer plainly points to the south. To the steel industry, this American hunt for oil, not only in the Western Hemisphere but in the Far East, has special significance. Wherever an oil field is developed by American capital, not only will its product be available either for our home refineries or for the more distant American bunker

From a paper presented at the New York meeting of the American Iron and Steel Institute, May 28, 1920. The author, George Otis Smith, is director, United States geological survey.

stations at the world's cross-roads, but all the supplies needed to develop and operate this foreign oil field will come from the United States.

Organize Safety Museum in New Jersey

A safety museum to rank with those operated in Milan, Paris, Berlin, and several English manufacturing centers, now is being organized in Jersey City, N. J. It is to be the first state clearing house of industrial standardization ever attempted in this country and it is intended to cover every phase of the wastes of productive industry. The executive committee is to be composed of representatives of chambers of commerce, insurance carriers and labor, with two advisory boards, one consisting of the chiefs of the bureaus of the New Jersey state department of labor and the board of health, and the other of representatives of all New Jersey industries employing more than 2500 operatives. The many subdivisions of the museum will be operated under a competent engineering and personal staff.

It is proposed to establish safety locals in each manufacturing center of the state. Practical engineers will give weekly talks at the museum in Jersey City, as well as at various headquarters of the safety locals, on subjects appealing to plant managers, superintendents and foremen.

Testing Metals Under Repeated Stress

BY H. F. MOORE AND J. B. KOMMERS

METALS while being subjected to fatigue have been observed under the microscope, and it has been found that the crystals of which a metal is composed will allow deformation to occur by movement along certain gliding planes within the crystal. This gliding or slipping is indicated by the appearance of lines running across the crystals, as shown in Figs. 1 and 3. These lines are called "slip lines," or "slip bands." Careful examination of cross-sections cut at right angles to the surfaces on which the slip lines occur has shown that the slipping causes microscopic ridges and depression of the surface, in the nature of steps. Vertical illumination of such a surface shows the steps as bright surfaces, and the inclined surfaces between the steps as dark lines or bands. As the test of the material in fatigue is continued, the slip lines become more numerous, and also broaden. Finally, some of these bands develop into a crack which spreads to other crystals and thus causes failure. It has been found that the crystals, which first develop slip lines, are not necessarily the ones in which final failure takes place.

From a paper presented at the New York meeting of the American Iron and Steel institute, May 28, 1920. The authors, H. F. Moore and J. B. Kommers are professor and associate professor respectively of engineering materials, University of Illinois.

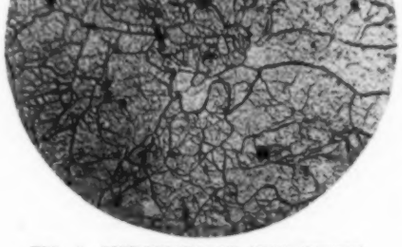


FIG. 1—MICROGRAPH OF IRON BEFORE REPEATED STRESS

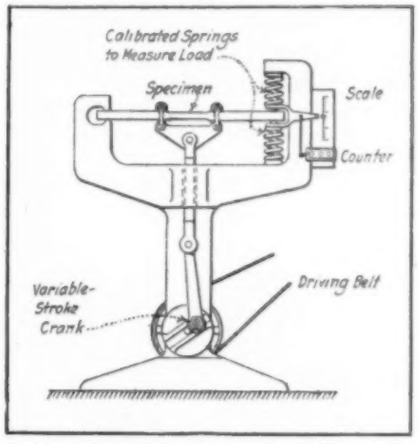


FIG. 2—TESTING MACHINE FOR FATIGUE TESTS USING CALIBRATED SPRINGS TO MEASURE LOAD

Tests conducted with apparatus of extreme sensitiveness have shown that the action of materials within the ordinary elastic limit is not perfectly elastic. For instance, when a specimen is first loaded in tension, and then the load is reduced to zero, the return path of the stress-deformation curve does not coincide with the original path, but lies slightly lower, the deformation seeming to lag behind the stress, so that when the stress is zero the deformation of the specimen is not yet back at zero. If now the specimen is loaded in compression, and the load reduced to zero, it is found that a loop has been formed by the stress-deformation curve. This loop is called a mechanical hysteresis loop from analogy with magnetic hysteresis.

The area of this loop represents energy which has been absorbed by the specimen, but which has not been given back again. In each cycle of stress, therefore, there is a small amount of work done because of the inelastic action of the material.

In determining the resistance of metals to fatigue, Wohler used machines which subjected the specimens to direct tension and compression, to repeated bending on a stationary beam, to reversed bending on a rotating cantilever beam, to repeated torsion, and to reversed torsion. In the direct stress, repeated bending, and in the torsion test Wohler used machines in which calibrated springs were employed to measure the load applied to the specimen. This general type of machine is common and is illustrated in Fig. 2. The rotating beam type, either cantilever or simple beam, has probably been more extensively used than any other machine. This type is illustrated in Fig. 4.

Wohler's machines applied the stresses at rates less than 100 per minute so that many weeks of testing were required to stress a specimen as many as 10,000,000 times. In later types of machines attempts have been made to increase the speed of the machines, and speeds up to 2000 revolutions per minute have been used successfully.

When specimens of a given steel are subjected to a series of stresses the results may be conveniently plotted as a curve having the unit stress, S, as ordinates, and the number of cycles for rupture, N, as abscissae. This curve may be plotted as shown in Fig. 6 (*left*);

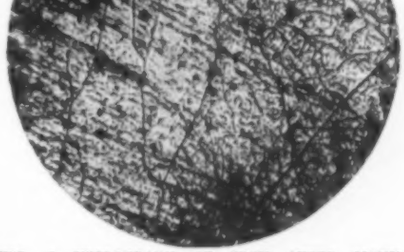


FIG. 3—MICROGRAPH OF IRON AFTER MANY REPETITIONS OF HIGH STRESS

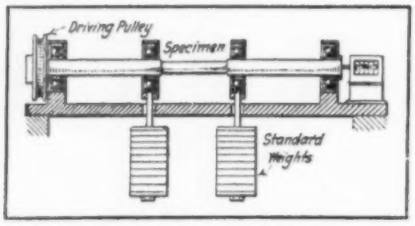


FIG. 4—DIAGRAM OF ROTATING TYPE OF FATIGUE TESTING MACHINE

or by plotting the logarithms of S and N curves such as shown in Fig. 6 (*right*) are obtained.

In discussions of fatigue tests the term "endurance limit" has been employed. By this is meant the unit stress at which the S-N curves as in Fig. 6 (*left*) seem to become horizontal, and therefore, presumably, the unit stress which the material could endure indefinitely. It has often been assumed that the unit stress corresponding to 1,000,000 cycles is too high to be considered as an endurance limit, and that failures may be obtained at lower stresses if the tests are continued a sufficient length of time. This matter is related to another doubtful point in connection with the curves of Fig. 6. The doubt arises because it is not known whether the logarithmic curves continue as straight lines for large values of N. It is of the greatest importance to know the nature of the S-N curve for large values of N, and this would probably be determined with sufficient exactness if tests were continued up to 100,000,000 cycles. If there is an endurance limit such tests will probably determine it with a sufficient degree of accuracy.

It should be noted that the use of an endurance limit assumes that this stress may be applied an indefinite number of times without causing rupture of the material. The relation expressed in Fig. 6 (*right*), called the exponential hypothesis, assumes that any stress, however small, if applied often enough, will finally cause failure.

Criteria for Fatigue Strength

Attempts have been made to show that a relation exists between the endurance limit and the elastic limit as determined from a static tensile test. These attempts have not been satisfactory, and this is to be expected, since the endurance limit which was used was itself indefinite. Furthermore, the elastic limit is also an indefinite quantity, and depends to a considerable extent upon the sensitiveness and accuracy of the instruments employed in determining it and upon the accuracy used in plotting the results. It has been shown that a material having a higher elastic limit than another one is not necessarily better in withstanding repeated stresses. It has also been shown that S-N curves for two such materials sometimes cross each other, so that the material which is apparently the better one for high stresses and low values of N is the poorer one for low stresses and high values of N. Data for low stresses and higher values of N are the ones that are of greatest importance to the designer of structures.

Treatments Affecting Fatigue Strength

The effect of various heat treatments on fatigue strength has not been studied systematically, although it is known that such treatments have an important influence. Overheating which tends to make material brittle seems always greatly to decrease the fatigue strength. Such overheated material may often be restored by proper reheating. Annealing, in general, seems to reduce the fatigue strength somewhat. The results on overstrained material are somewhat contradictory, some tests seeming to indicate increased fatigue strength, and others that tensile overstrain decreases fatigue strength while compressive overstrain increases the strength. The sorbitic structure in steels seems to be most effective in resisting fatigue, while the martensitic structure is weak. Material which has been subjected to repeated stresses apparently does not have its life increased by annealing or by rest.

FIG. 5—MACHINE USED FOR INVESTIGATING FATIGUE OF METALS

Stove Manufacturers Hold Meetings in Boston

At the annual meeting of the Stove Founders National Defense association held Tuesday, May 11 at Boston, labor problems were discussed and the following officers were elected: President, George Mitchell, Pittston Stove Co., Pittston, Pa., and secretary, Robert M. Sloan, Scrantno, Pa.

At the meeting of the National Stove Manufacturers association on Wednesday, May 12, reports of various committees were submitted and new committees were appointed. Robert Denham, the Denham Cost Finding Co., presented a paper on cosets for individual machines. He declared that time of operation is a better basis for accounting than labor costs. Wednesday afternoon J. E. Parlan, Curtis Publishing Co., Philadelphia, outlined the causes for existing conditions in the business world. He stated that the buying movement last fall was due largely to the prosperity of farmers. He emphasized the importance of the farmers in the present industrial situation.

Thursday the vice president of the Buck Stove & Range Co., St. Louis, presented a paper dealing with the enameling of stove plate.

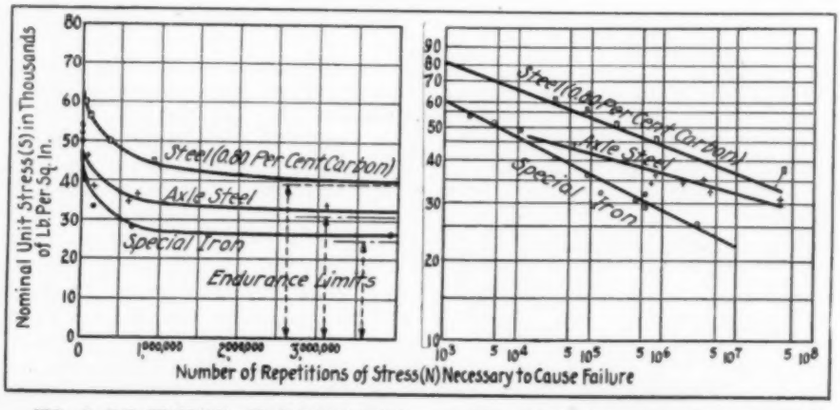

Nominal Unit Stress (S) in Thousands of Lb. Per Sq. In.
Steel (0.80 Per Cent Carbon)
Axle Steel
Special Iron
Endurance Limits
Number of Repetitions of Stress (N) Necessary to Cause Failure

FIG. 6—S-N DIAGRAMS OF FATIGUE TESTS. (LEFT) ORDINARY CO-ORDINATES. (RIGHT) LOGARITHMIC CO-ORDINATES

Castings Fill Diversified Needs

Properties of Steel, Gray Iron, Malleable, Aluminum, Brass and Bronze Castings Give Engineers Choice of Materials Especially Adapted to Wide Range of Engineering Requirements—Urge Proper Use of Castings

MECHANICAL engineers are called upon to decide or advise on selecting the proper kind of castings for a given piece of construction and therefore should know or have available reliable information regarding the present status of foundry practice. The following articles on six types of castings are abstracted from the papers presented in a symposium on castings at the St. Louis meeting of the American Society of Mechanical Engineers, May 24-27.

Each paper outlines the special properties of castings made of the particular metal in question and states why castings of this kind are preferable to others. The entire series of papers is intended to give the engineer an idea of the performance and range of possibilities of each of the various castings.

In studying the articles, the reader will be impressed by the changes in foundry practice which took place during the war, due largely to the difficulty in obtaining certain materials and also to the influence of the specifications for ordnance materials. It is safe to say that the industry emerged from the war period making castings of a higher grade than ever before.

Selecting Steel Castings Intelligently

BY JOHN H. HALL

NOTWITHSTANDING the fact that the art of steel founding had been brought to a high state of perfection before the war as regards soundness of castings produced and their accuracy to dimensions, the general character of the output of a steel foundry, as first-rate foundrymen will agree, has been limited in great measure, not by what it is able to make, but by the demands of the customer. This has been, and unfortunately still is, due to the fact that the buyer of castings inclines too much to the viewpoint of the efficiency engineer in the machine shop, and is willing to subordinate everything but actual soundness to ease and speed of machining—in fact, he generally insists that the castings be made with an eye first of all to the latter requirement. This attitude, it may be said, is justified in part by the fact that in meeting keen competition, a few minutes or even seconds of extra machining time per casting mean the difference between profit and loss on a job. Castings are now being made that show all-around physical properties nearly twice as good as those of the ordinary commercial steel casting, but the average machine-shop proprietor absolutely cannot be persuaded to use them, simply because they do not machine quite so freely as those he has been accustomed to in the past.

There are practically no limitations to the maximum and minimum weights of steel castings that can be produced commercially. The foundryman using a small bessemer converter, a crucible furnace, or a small electric furnace can and does make castings with sections as light as 3/8-inch, and in some cases even 1/4-inch, provided their size and intricacy is not such as to make this impossible. On the other hand, the open-hearth furnace will pour castings as heavy as are ever called for, some poured in the last few years weighing 150 tons or even more, and with maximum sections of several feet. In fact, the steel foundryman is not so much concerned with the actual thickness of any particular section as with the combination of thick and thin sections in one and the same casting. When absolutely necessary, he can execute a casting of great intricacy in which thick and thin sections occur, often in exasperating combinations; but it is an undoubted fact that if the designer of castings would take counsel more often with the foundryman, he would obtain advice that would help him to secure a far better casting, and one that would more successfully meet the service it is called upon to stand.

Physical Properties of Steel Castings

The physical properties of the average commercial steel casting depend largely upon whether or not the casting has been annealed. Perhaps 50 per cent of the steel castings made in this country are shipped without annealing. The American Society for Testing Materials specifications for steel castings call for two classes. Class A castings "need not be annealed unless so specified." The carbon of these castings is specified not over 0.30 per cent, and the phosphorus not over 0.06 per cent (at present 0.07 per cent is allowed). Such castings will test about as follows: Tensile strength, pounds per square inch, 60,000; yield point, pounds per square inch, 25,000; elongation in 2-inch, per cent, 10 to 15; and reduction or area, per cent, 15 to 25.

The A. S. T. M. specifications do not call for tensile or bending tests on class A castings. These specifications are intended to cover only such castings as are not subject to very severe service, and in which the chief characteristics desired are soundness and comparatively easy machining.

When we come to consider resistance to sudden heavy shocks, the danger of using unannealed cast steel for severe service strikes us most forcibly. Tests made by the writer have shown that under heavy shock cast steel even as low in carbon as 0.10 per cent breaks almost without bending, and with very little absorption of energy. In other words, the metal is truly brittle under impact test. After ordinary annealing the resistance to shock is greater, and the test piece bends through a greater angle before rupture. If the steel under test has been heat-treated by rapidly cooling and reheating, the shock resistance and angle of bend are increased to an even greater extent.

The A. S. T. M. class B castings must not exceed 0.05 per cent phosphorus or sulphur. (At present this has been temporarily increased to 0.06 per cent.) No other chemical specifications are given, the analysis other than phosphorus and sulphur being left

The author, John H. Hall, is metallurgist, Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

to the judgment of the foundryman. Annealing, however, is specified. These castings are divided into three grades—hard, medium, and soft—which must give physical properties as follows: Tensile strength, pounds per square inch, 80,000, 70,000 and 60,000, respectively; yield point, pounds per square inch, 36,000, 31,500 and 27,000; elongation in 2-inch, per cent, 15, 18 and 22; reduction of area, per cent, 20, 25 and 30; and cold bend around 1-inch pin, degrees, for medium, 90 and for hard 120.

Too Many Test Pieces Required

Reliable foundries can meet these specifications with practically no trouble beyond the expense necessarily due to meeting the requirement that castings be kept together by heats as poured, and the cost of making the test specimens and carrying out the tests. Most specifications as now written call for so many test pieces that the cost of producing the castings is considerably increased. This is particularly true when it is specified that a test shall be attached to each and every casting over a certain weight. The writer has known cases in which this specification was literally insisted upon where as many as 50 almost identical tests were pulled from a heat of open-hearth steel. The A. S. T. M. specifies a test attached to every casting weighing over 500 pounds unless the sections are such that a satisfactory test piece cannot be attached to it. In that case, and for castings under 500 pounds, two test bars may be cast to represent a heat, or "in the case of small or unimportant castings, a test to destruction on three castings from a lot" may be used. This test shall show the material to be "ductile, free from injurious defects, and suitable for the purpose intended." This provision for testing small castings to destruction in place of using test bars is an excellent one and should be used more than it is.

In order to meet specifications similar to those of the A. S. T. M., class B, annealing is essential. The annealing practice followed is almost invariably such as to give the castings the greatest possible softness and ease of machining, and no heat treatment as the term is usually interpreted is needed to meet these specifications if the steel is well made in the first place. Castings annealed in this manner should machine very freely or fairly freely, depending upon whether they are of "soft" or "hard" grade, as prescribed. If the first cut is deep enough to get well under the scale left by annealing and if the casting is free from adhering sand, it should give no trouble in machining.

Heat treatment as usually understood, that is, annealing the castings at a proper temperature, cooling more or less rapidly, and then heating a second time, produces castings with very much better physical properties than those of plain annealed cast steel, and at the same time produces a somewhat harder and much-finer-grained steel which has far better wearing qualities and much better resistance to fatigue than is possible in the case of castings which are simply annealed. In extreme cases, by using heat treatment and special analysis, it is possible to produce castings that will show as good tensile strength as "Class B Hard" of the A. S. T. M. specifications, and equal or exceed the elongation, reduction of area and bend of "Class B Soft" castings. The yield point especially is raised by heat treatment, and the wearing properties are improved. The resistance to fatigue is also greatly increased, and, most important of all, the power to resist sudden shock is enormously improved.

The cost of steel castings, of course, varies with the size, weight, and intricacy of the pattern to be executed. At the present time heavy castings such as are suitable for production in open-hearth foundries can be obtained for from 8 cents per pound up, depending upon the difficulty of the job, while small and difficult castings command a price of about 12 cents per pound up No upper limit for price can very well be given, as very small or difficult castings, on which a piece price is often quoted, may go as high as $1 per pound or even higher; but the foregoing figures are close enough for comparative purposes.

Specifying Steel Castings

Steel castings should be used for all cases where a forging is not suitable or is prohibitive in cost, and where the service to be rendered calls for strength and toughness combined. To enumerate the uses of steel castings would be virtually impossible. It is enough to say that cast iron is suitable for service in which the stresses are chiefly compressive, or where the stresses to be endured can be taken care of by increasing the size of the casting, regardless of the resulting weight. In fact, in many cases where cast iron is used, as in bedplates of engines and heavy machines, great weight for a given strength is even desirable. Where moderate strength and toughness, combined with fairly high resistance to wear and fatigue, are desired, a malleable-iron casting will give good satisfaction. When, however, the service demands all the strength, toughness, and resistance to wear and fatigue that are obtainable in a cast metal, a steel casting should be specified; and if the service is unusually severe, the engineer should use the best cast steel he can buy, and should not allow himself to be influenced in his choice by the fact that the metal does not machine as freely as inferior cast steel or malleable iron.

Gray Iron Suitable for Many Purposes

BY RICHARD MOLDENKE

CAST iron, with all its lack of homogeneity and consequent requirements of large factors of safety, is of such variety in physical properties that few engineers are familiar with the many uses to which it can be put satisfactorily. It may run from glass-hard to dead-soft, from a condition of brittleness to one of considerable toughness and elasticity, appear silvery to black in fracture, may be made acid proof and also yield to acid attack promptly; and, strange to say, may exhibit some of these diametrically opposite properties in the same casting. Therefore, even though he depends upon the foundryman to deliver him the kind of casting he needs, the engineer should have some knowledge of the underlying causes for the peculiar properties exhibited by cast iron when put into the form of castings.

The foundry industry is pretty well divided up into specialized lines of work. If the engineer needs chilled castings he turns to the makers of chilled rolls. Many foundries, however, other than roll makers produce crusher castings, balls for grinding, and shoes and dies for stamp mills. Another important branch of foundry work is the making of cylinders. For the highest grade, foundries having air furnaces should be selected, particularly if they make a specialty of cylinders, piston rings and the like, and these will be found among the great foundry and machine works

The author, Richard Moldenke, is consulting metallurgist, Watchung, N. J.

of the country building heavy machinery and engines (particularly of the marine type). Castings to withstand high pressures, such as those of air, steam and ammonia, are made by foundries specializing in air compressors, pumps, refrigeration machinery, and the general valve and fitting trade. For light parts to serve for ornamental purposes there are many stove shops to which recourse may be had. In general, however, where reciprocating parts or sections of intricate character and subject to severe strains are required, it is safer to go to the large concerns making well and favorably known lines of product. The foundries connected with such establishments have the proper facilities and the trained men to undertake the work, and will be in position to advise improvements in design to give the metal a better chance for the purpose intended. Foundries of the class just mentioned usually have need of several mixtures of iron to supply the parts required for the line of machinery turned out. Hence they usually run a few charges of fairly low-silicon, high-steel scrap metal for such castings as air compressor cylinders, rolling mill parts, and other work of high strength and density. The next charges may then care for ordinary machinery castings, and finally a few extra soft or high silicon charges may care for pulleys and the very light section product. Sometimes the process is reversed, all light, soft work being run first and the harder classes at the end of the heat.

Gray Iron for Machinery

On account of the lack of elasticity and its massiveness, cast iron is ideal for frames for machinery of all kinds, and as it can be locally chilled to give splendid wearing surfaces where needed, built-up structures of several materials can be avoided. The reduction in the total carbon through steel additions to the mixture can be carried to a point where the chips taken from such a casting curl up almost as well as those from hard steel, and hence such metal serves very well where it is not essential that steel be used.

The passing of the war has given us time to realize more fully the train of evils that have been the legacy to the foundry. A cataclysm such as this cannot but have disorganized everything it has touched, and so the foundry is manned today by operatives giving but part of the output of previous days, the character of the work is itself poorer, corrective measures are impossible of application, and hence the industry is far behind the present demand for castings. Until labor seeks work conditions will be no better, and prices are the rule which take into account all kinds of eventualities. So much for the operating end. On the technical side matters are just as bad. While there was a tremendous expansion of other industries due to war demands, the foundries simply pushed production to the utmost consistent with ability to get raw materials and men. Impossible prices for pig iron resulted in the use of so high a proportion of scrap in the mixtures that when the castings made during this period of stress eventually land into the scrap piles of the country—probably within the next 20 years—a serious problem of very high sulphur and oxidized iron will confront the foundryman. Instances of 90 per cent scrap in the mixture were common and castings with over 0.20 per cent sulphur content were found equally common.

The problem will have to be faced, and there are two possible solutions. The method heretofore employed in such a case is the increased use of pig iron in the mixtures. Before the war the common practice was to use not over 40 per cent scrap with 60 per cent pig. Now it is reversed. Consequently, instead of having the sulphur run about 0.08 per cent maximum in important work, it is more nearly 0.12 per cent. Ordinary work today touches 0.18 per cent without much comment. It is true that even a higher sulphur content will not militate against machinability provided the melting practice is of the very best, but the castings are more subject to

Recommended Analyses for Gray Iron Castings

Castings	Light					Medium					Heavy				
	Si	Mn	S	P	T.C.	Si	Mn	S	P	T.C.	Si	Mn	S	P	T.C.
Acid-resisting	2.00	0.75	0.05*	0.20*	3.25*	1.50	1.25	0.05*	0.20*	3.25*	1.00	1.25	0.05*	0.20*	3.25*
Agricultural	2.50	0.60	0.06	0.75	3.75	2.25	0.70	0.08	0.70	3.50	2.00	0.80	0.10	0.60	3.25
Air Cylinders	1.90	0.70	0.08	0.50	3.40	1.50	0.08	0.09	0.40	3.25	1.00	0.90	0.10	0.30	3.00
Annealing Boxes	....	....	....	....	....	0.65	0.20	0.08	0.20	3.50	....	....	....	....	....
Automobile Cylinders	2.25	0.65	0.08*	0.40*	3.25*	2.00	0.75	0.08*	0.40*	3.25*	....	....	....	....	....
Balls for Grinding	....	....	....	....	....	0.75	0.50†	0.15*	0.40*	3.75†	0.50	0.50†	0.15*	0.40*	3.75†
Bedplates	2.00	0.70	0.08	0.60	3.75	1.75	0.75	0.10	0.50	3.50	1.50	0.80	0.12	0.40	3.25
Boiler Castings	....	....	....	....	....	2.00	0.80	0.06*	0.20*	3.50*	....	....	....	....	....
Car Wheels	....	....	....	....	....	....	....	....	....	....	0.65	0.50	0.08	0.35	3.50
Chilled Castings	....	....	....	....	....	....	....	....	....	....	....	1.00	0.06*	0.20*	3.50*
Chills	....	....	....	....	....	1.00	0.50	0.05	0.20	3.00	....	....	....	....	....
Crusher Jaws	....	....	....	....	....	1.00	1.00	0.04	0.20	3.50	0.80	1.25	0.06	0.20	3.25
Dies for Hammers	....	....	....	....	....	1.50	0.60	0.05	0.20	3.00	1.25	0.80	0.06	0.20	2.75
Dynamo Castings	2.50	0.50	0.05	0.75	3.75	....	....	....	....	....	2.15	0.50	0.06	0.50	3.25
Electrical Work	3.00	0.50	0.03	0.60	3.75	2.75	0.50	0.05	0.50	3.50	....	....	....	....	....
Engine Frames	....	....	....	....	....	2.00	0.60	0.08	0.50	3.50	1.75	1.00	0.10	0.40	3.00
Fire Pots, Grates	2.25	0.60	0.05	0.20	3.50	2.00	0.80	0.06	0.20	3.25	....	....	....	....	....
Fly Wheels	2.00	0.50	0.05	0.50	3.50	1.50	0.60	0.06	0.40	3.25	1.25	0.70	0.08	0.30	3.25
Friction Clutches	2.40	0.60	0.10	0.70	3.75	2.00	0.70	0.12	0.50	3.50	....	....	....	....	....
Furnace Castings	2.40	0.60	0.05	0.60	3.75	2.15	0.80	0.06	0.50	3.50	....	....	....	....	....
Gas-Engine Cylinders	2.00	0.70	0.08	0.40	3.25	1.50	0.80	0.09	0.30	3.00	1.25	0.90	0.10	0.20	2.85
Gears	2.25	0.60	0.08	0.70	3.75	2.00	0.80	0.09	0.60	3.50	1.50	1.00	0.10	0.50	3.25
Glass Molds, Pipe Balls	....	....	....	....	....	2.50	0.60	0.04	0.20	3.25	....	....	....	....	....
Grate Bars	....	....	....	....	....	2.00	0.60	0.05	0.20	3.50	....	....	....	....	....
Gun Iron	....	....	....	....	....	1.50	0.50	0.05	0.30	3.25	1.00	0.60	0.05	0.30	3.00
Hardware	2.50	0.70	0.08	0.80	3.75	....	....	....	....	....	....	....	....	....	....
Heat-resistant Iron	....	....	....	....	....	2.00	0.80	0.06	0.20	3.25	1.50	1.00	0.06	0.20	3.00
Hydraulic Cylinders	....	....	....	....	....	1.50	0.80	0.05	0.40	3.25	1.00	1.00	0.08	0.20	2.85
Ingot Molds	....	....	....	....	....	....	....	....	....	....	1.25	0.80	0.06	0.20	3.75
Machinery Castings	2.50	0.60	0.08	0.70	3.75	2.00	0.80	0.09	0.60	3.50	1.50	1.00	0.10	0.50	3.25
Mine Wheels	....	....	....	....	....	0.90	1.00	0.10	0.20	3.00	....	....	....	....	....
Ornamental Castings	2.75	0.60	0.06	0.90	3.75	2.25	0.70	0.08	0.80	3.50	....	....	....	....	....
Pipe (Water)	2.25	0.60	0.06	0.80	3.75	2.00	0.80	0.08	0.70	3.50	1.50	1.00	0.10	0.60	3.50
Piston Rings	2.00	0.70	0.05	0.60	3.50	1.75	0.80	0.06	0.50	3.25	....	....	....	....	....
Pulleys	2.40	0.50	0.05	0.70	3.75	2.15	0.60	0.07	0.60	3.50	1.90	0.70	0.09	0.50	3.25
Radiators	2.25	0.70	0.06	0.80	3.50	....	....	....	....	....	....	....	....	....	....
Rolls (Chilled)	....	....	....	....	....	....	0.80	0.06	0.40	3.25	....	1.00	0.08	0.30	3.00
Soft Castings	2.60	0.50	0.06	0.60	3.75	2.40	0.60	0.08	0.50	3.50	....	....	....	....	....
Soil Pipe	2.25	0.60	0.08	0.80	3.75	2.00	0.80	0.10	0.60	3.50	....	....	....	....	....
Steam Cylinders	2.00	0.60	0.08	0.50	3.50	1.60	0.80	0.09	0.40	3.50	1.25	1.00	0.10	0.30	3.50
Stove Plate	2.50	0.50	0.06	1.00	3.75	2.25	0.60	0.08	0.80	3.50	....	....	....	....	....
Valves	2.25	0.60	0.07	0.50	3.25	1.75	0.80	0.08	0.40	3.00	1.25	1.00	0.09	0.30	2.85
White Iron Castings	....	....	....	....	....	0.75*	0.20†	0.25*	0.75*	2.50†	....	....	....	....	....

*Below. †Above.

danger from shock and casting strains.

The other method for correcting the high sulphur tendency in daily work at present and for that to come, would be a desulphurization process. Until very recently no method of this kind was available, but fortunately the electric furnace has been drawn upon for this purpose and is doing the work with complete satisfaction. Instead of melting the charges from the cold state, as is the case in electric steel developments, the regular cupola method is employed and the molten metal is transferred into an electric furnace having a basic lining. In this way the heavy current variations are avoided and by taking advantage of the comparatively cheap cupola melting cost, that of the electric furnace for refining only is very materially reduced. It is a question whether more than a quarter of a cent is thus added to the cupola melting cost per pound of metal "duplexed," where current is cheap.

Molten cupola metal with possibly 0.12 per cent sulphur may thus be brought down to about 0.05 per cent and even lower. Moreover, the metal is highly superheated—cupola metal itself is intensely hot as compared with furnace iron—and thoroughly deoxidized. The castings made are therefore much better and sounder than the ordinary run, equaling charcoal iron castings made in the air furnace. The first cost of the installation is high, but soon pays for itself in the quality of work turned out. While developed during the war period it is none the less a logical sequence in the world advance of the art of making iron castings, and should be welcomed as a satisfactory way out of a very bad situation ahead.

In conclusion, the mechanical engineer is urged to turn his attention more specifically to foundry operation. Castings should be made strictly for the purpose intended and not merely to get by the machine shop safely. Close co-operation between men trained in the science with those trained in the art of making castings can result only in good.

Specifying Malleable Iron Castings

BY ENRIQUE TOUCEDA

IN GENERAL, the selection of the proper kind of a ferrous casting for use in a given piece of construction is dependent upon: Ability to successfully withstand the abuse to which it will be subjected in service; high rate and dynamic strength, which implies minimum sections for the strains involved, this in turn implying low cost for raw castings, as such are not only less costly in direct proportion to their strength, but their appearance is enhanced thereby; ease of machining, accompanied by a good surface on faced and turned parts, and freedom from unsoundness; which implies beauty of finished castings and low cost due to less loss from defective castings, and smoothness of surface, and trueness to pattern.

In discussing the foregoing a fact should be remembered that is frequently overlooked, namely, that the gray iron, the malleable iron and the steel casting have each a legitimate field of their own quite sharply defined by virtue of certain peculiarities possessed by each particular product. If a bedplate is desired for a certain large and ponderous machine, so dimensioned as to possess sufficient mass to enable it to absorb vibration, it would be unwise to specify that it be made of malleable cast iron. The malleable-iron founders are not at the present time equipped to cast and anneal castings of such size, and as cheapness and weight—obviously not high strength per square inch—are the dominant requirements in this case, the malleable iron casting should not be specified. The same remarks hold good in the case of the steel casting, except of course that it is practical to make such castings as large as any made of gray iron.

In commercial practice the engineer who has placed his contract with a reliable foundry can depend upon a uniformity of product that will rarely have a yield point lower than 31,000 pounds per square inch and frequently as high as 33,000, an ultimate strength less than 50,000 pounds, or an elongation less than 10 per cent. He can quite safely depend upon the integrity of the casting, for the reason that the founder has finally learned through costly experience that freedom from shrinkage depends not only upon correct gate emplacement, but more particularly upon the use of large shrink heads, so located as to eliminate such defects. Castings have been produced commercially as long as 5 feet, with sections at some parts as thick as 3 inches. In regular practice castings varying in weight from 300 to 500 pounds are made daily, while it would be difficult to place a limit on how small they can be run.

Comparative Costs of Castings

The wearing properties of this metal correspond to what can be expected of wrought iron or dead soft steel, while as is well known its machining properties can hardly be excelled. As far as the ordinary uses of malleable cast iron are concerned, the writer feels quite certain that no beneficial results can follow from its heat treatment. In a limited number of cases, however, such as in the production of cheap hatchets, cleavers, and axes, malleable iron can be made file-hard by heating to just above the critical range and quenching.

A general statement relative to the comparative cost of manufacture of the three products mentioned must obviously involve the consideration of many different cases and conditions. If it were not for the fact that in the case of the manufacture of malleable iron the annealing (which lasts from six to seven days and is a rather costly part of the process) must be taken into account, an approximate estimate could be made by figuring out the cost of the metal in the ladle for each of the three products; but the varying cost of molding in each case and the fact that the sprue can be easily knocked off from both gray and malleable iron castings while it must be machined or cut off from the steel casting, render it rather difficult to make a comparison of the costs of the raw castings. In general, however, gray iron castings run heavier than do those made of malleable iron. Consequently there is less sprue and therefore less remelt. Also there is less variation between the composition of the sprue and that of the charge and as a consequence a much larger percentage of scrap can be used in the mixture when making gray iron than is possible in the case of the malleable castings. Assuming the highest fuel ratio in each case, 10 of iron to 1 of coke for the cupola, and 3 of iron to 1 of soft coal in the air furnace, it will be seen that the cost for fuel is less in the former than in the latter case. The same holds true in connection with furnace maintenance. Aside from cleaning and chipping, the gray iron casting is finished when the metal fills the mold, while the white iron castings must be cleaned, taken to the annealing room, packed in saggars, and then charged into the annealing oven and heat treated for a period in most instances of seven days. The saggars must then be removed from the annealing oven, the castings

The author, Enrique Touceda, is consulting engineer, Albany, N. Y.

again cleaned and sorted, to the cost of which must be added that of the fuel used for heat treatment, oven maintenance, supervision, and overhead. It can therefore be very easily seen that there must be considerable difference btween the cost of production of these two products. The writer believes that on an average it will easily cost 1 cent a pound more to produce malleable iron than it will the gray iron castings, and at least 30 per cent more to produce steel castings than malleable.

The malleable iron casting is regularly used and can be recommended in the fabrication of railway cars, agricultural implements, motor vehicles, tractors, link belts, chain, fittings, stoves, etc., and is adapted for use for any part of such size as can be successfully made where strength combined with ductility is a necessity and low cost per pound an essential qualification of the product.

Outlines Properties of Die Castings

BY CHARLES PACK

DIE castings may be defined as castings made by forcing molten metal, under pressure, into a metallic mold or die. The die casting process is best adapted to alloys of comparatively low fusing points which may, for convenience, be divided into the following groups:

Zinc alloys, consisting of zinc alloyed with tin, copper, or aluminum; tin alloys, consisting essentially of tin alloyed with copper, lead, or antimony; lead alloys, consisting essentially of lead alloyed with tin or antimony; and aluminum alloys, consisting essentially of aluminum alloyed with copper.

A typical zinc alloy for die castings is that whose composition is zinc, 87.5; tin, 8; copper, 4; and aluminum, 0.5 per cent. Castings made from this alloy should not be used for parts that are subjected to severe stress or sudden shock in service.

The five compositions given below are typical die casting alloys of the tin group:

	Tin Per Cent	Copper Per Cent	Lead Per Cent	Antimony Per Cent
No. 1	90	4.5	0	5.5
No. 2	86	6	0	8
No. 3	84	7	0	9
No 4	80	0	10	10
No. 5	61.5	3	25	10.5

Alloy No. 1 is a so-called "genuine babbitt" metal and was used very extensively during the war for mainshaft and connecting-rod bearings on all American-made airplanes and motor trucks. No. 2 is somewhat harder and is used extensively for bearings in internal combustion engines. No. 3 is somewhat harder than alloy No. 2 and is the S. A. E. standard for high grade internal combustion engine bearings. No. 4 is in general use for light bearings on stationary motors. No. 5 is a bearing metal for light duty and is used on a large number of moderate priced automobiles for mainshaft and connecting rod bearings.

Tin alloys find their largest field of application in their use as bearings for internal combustion engines. They are also used for other purposes where a tensile strength of over 8000 pounds per square inch is not essential and where resistance to corrosion is of importance. They are not affected by water, weak acid, or alkaline solutions, and when free from lead, are extensively used for food container parts.

Selecting Lead Alloys

The following four compositions are those of lead alloys widely used in the production of die castings:

	Lead Per Cent	Tin Per Cent	Antimony Per Cent
No. 1	83	0	17
No. 2	90	0	10
No. 3	80	10	10
No. 4	80	5	15

Alloy No. 1 is generally known as C. T. metal, due to its extensive use in the manufacture of coffin trimmings. This alloy is also a good bearing metal for light duty and is employed for thrust washers and camshaft bearings on light internal combustion engines. No. 2 is somewhat softer and more ductile than No. 1. No. 3 is much used for light bearing duty, being somewhat tougher and stronger than Nos. 1 and 2. No. 4 is somewhat harder than No. 3 but less ductile. Many similar alloys may be compounded, all of which may be die cast readily.

Lead alloys may be used where a metal of noncorrosive properties is desired and where a tensile strength of not over 8000 pounds per square inch will suffice. They should not be used for parts that may come in contact with foods or that may be handled often in service, since the poisonous properties of lead and lead alloys are well known.

A typical aluminum alloy for use in die casting work has the following composition: Aluminum, 92 per cent; copper, 8 per cent.

The alloy is well known in the arts as No. 12 alloy and is used very extensively for automobile and airplane parts. By varying the copper content harder or softer alloys may be obtained, all of which may be die cast successfully. Aluminum die castings find wide employment in the manufacture of parts of automobiles, such as spark and throttle control sets, magneto parts, battery ignition and lighting systems, speedometers, etc.

The cost of die castings cannot be computed on the pound basis since it depends on the design of the piece, the number and position of the cores, the quantity to be produced and certain other factors. For comparative purposes it may be stated that at the present time tin alloy castings are the highest in cost, being followed by those of aluminum alloy, zinc alloy, and lead alloy in the order named.

The author, Charles Pack, is chief chemist, Doehler Die Casting Co., Brooklyn, N. Y.

Selecting the Proper Brass Castings

BY CHRISTOPHER H. BIERBAUM

THE terms "brass" and "bronze" are not as definite in their meaning as might be desired. In general, it may now be said that without a modifying adjective brass is an alloy of copper containing a large amount of zinc, and bronze is an alloy of copper containing a relatively large amount of tin. For the present, in this discussion, these alloys will be designated according to the prevailing commercial usage in this country, and other alloys will, as far as possible, be designated in the order of their preponderant constituents. Thus, the copper-tin-lead alloy is one containing, by weight, more copper than tin, and more tin than lead.

In general the engineer should be cautioned against specifying alloys upon which he has only such knowledge as has been derived from laboratory tests

The author, C. H. Bierbaum, is vice president, Lumen Bearing Co., Buffalo.

alone, since it is impossible to determine, by ordinary experiment, all of the economic conditions which enter into the founding and tooling of a casting and the requirements of a subsequent satisfactory use of an alloy for any given service.

Aluminum should never be used in an alloy which is to be tight against leakage of either a gaseous or fluid substance. Aluminum has the peculiar property of forming a characteristic skin upon the surface of its alloys, due to its great affinity for oxygen. Appreciably less than one two-hundredths of 1 per cent of aluminum produces an appearance upon the surface which is very distinctly that of a brass or bronze casting. In fact, this surface film is often found in castings where the amount of aluminum present is so small that the chemist may be in doubt as to whether even a trace of it exists.

Manganese Bronze

Manganese bronze is the term generally applied to a composition which, properly speaking, is a brass instead of a bronze. It is an alloy of copper containing a high percentage of zinc, aluminum and iron, in which a small amount of manganese has been used. The beneficial effects in this alloy, due to the deoxidizing and iron carrying properties of the manganese, are very striking. When this material is made up with the necessary precautions as to purity and foundry methods, very excellent commercial results can be obtained. For example, a tensile strength of 90,000 pounds per square inch with 30 per cent elongation can be secured in a standard test coupon, whereas many producers consider 65,000 pounds tensile strength with 15 per cent elongation as fair.

Aluminum bronze is an alloy of copper and aluminum containing from 4 to 11 per cent of aluminum and the remainder copper. In recent years, however, this alloy has been made up with an addition of from 1 to 6 per cent of iron. The introduction of iron causes the alloy to solidify with smaller crystals, that is, it produces a finer grain and it adds a third hard crystal formed by the union of aluminum and iron which is much harder than the other two crystals. This is the only brass foundry product which can compete commercially with manganese bronze.

Acid-Resisting Bronzes

Acid-resisting bronzes formerly were of more importance than they are today, owing to the fact that stoneware and especially modified cast iron are now largely replacing these uses. There are, however, some uses for bronzes to resist sulphuric and sulphurous acids in mine service, pulp mills and other industries. First among the copper-tin alloys highest in its tin content may be mentioned bell metal, a composition from 16 to 25 per cent of tin. As the name implies, it is used for the manufacture of bells, gongs, steam whistles and the like. It is a resonant metal. For industrial purposes the compositions used are those having the lower percentages of tin, say from 16 to 18 per cent. The higher percentages of tin, especially between 20 and 25 per cent, are used for bells in which high tone quality is required.

The next alloy of this type to be considered is a bronze used in turntables and movable bridges. This composition is given in the tentative A. S. T. M. specification as "Class A, Bronze Bearing Metals for Turntables and Movable Bridges." It is also given as "Grade A" in the American Railway Engineering association specification bulletin of July, 1918. It contains 20 per cent of tin, and phosphorus not to exceed 1 per cent. It is very hard, due both to its tin and its phosphorus contents. For best service conditions it should not be used except when placed between hardened steel plates. It is intended for pressures over 1500 pounds per square inch and slow moving bearings.

A composition similar to the foregoing is one given as "Class B Bronze" under both of the immediately foregoing specifications and containing 17 per cent of tin with a permissible phosphorus content of 1 per cent. It does not seem wise to permit this amount of phosphorus in a bearing metal of this kind, however, if to be used as specified between "soft steel plates." Better service conditions can be obtained by the production of the necessary hardness through increase of tin content and reduction of phosphorus.

The next alloy of importance as to its tin content is a bronze containing 11 per cent of tin and a maximum of 0.2 per cent of phosphorus. This alloy is the standard composition now in very general use for worm wheels in motor truck drives and in the motor car reduction worm gears.

Ordnance Bronze or Gun Metal

The most popular copper-tin-zinc alloy is the one known as ordnance bronze or gun metal. Its composition is 88 copper, 10 tin and 2 zinc. This alloy has come to be a very generally known composition in that it is a general average bronze. However, with a more complete metallurgical knowledge of the relative values of different compositions, it becomes of less importance, in that it is specifically neither a bearing bronze of high merit nor a bronze especially adapted for machine parts when maximum economy of alloy is considered.

Copper-tin-lead alloys are strictly bearing compositions containing not in excess of 82 per cent of copper and a tin maximum of 11 per cent with a lead maximum also of 11 per cent. This range of alloy corresponds to "Class C" of the A. S. T. M. tentative specifications for bronze bearing metals for turntable and movable railway bridges.

Aluminum Castings Have Many Uses

BY ZAY JEFFRIES

ALUMINUM castings may be divided into three classes according to the method of manufacture, namely, sand castings, permanent-mold castings, and pressure die castings.

Aluminum sand castings have been regularly made weighing as high as 480 pounds each, but one of from 150 to 200 pounds is usually considered a large casting. The minimum weight may be taken as 1 ounce, but neither this weight nor 480 pounds should be considered as an extreme limit. In the permanent-mold process the maximum weight is about 20 pounds and the minimum weight about 1 ounce. Permanent mold castings have been made weighing as high as 150 pounds but these large castings should be considered as special.

On gas engine oilpans the walls should be $\frac{3}{16}$-inch or more in thickness and on crankcases a wall thickness of $\frac{3}{32}$-inch or greater is common practice. Fillets should have large radii, especially where heavy sections join thin sections. The best thickness on pipes, manifolds, etc., is $\frac{1}{8}$ to $\frac{3}{32}$-inch. The minimum thickness on permanent mold castings is $\frac{3}{32}$ to $\frac{1}{8}$-inch.

On large sand castings $\frac{1}{8}$-inch should be allowed for finish and on bench work $\frac{3}{16}$-inch. A finish of $\frac{3}{32}$-inch should be allowed for disk grind. The finish on permanent mold castings up to 3 inches in diameter, for example, pistons, should be about 0.075-inch on the diameter, and the finish on the piston head should be 0.045-inch. The

The author, Zay Jeffries, is director of research laboratory, Aluminum Castings Co., Cleveland.

finish on permanent mold pistons over 3 inches in diameter should be about 0.093-inch.

In sand castings a tolerance of 3/32-inch in thickness should be allowed and in permanent mold castings the tolerances are plus or minus 0.010-inch. The weight tolerances on sand castings using metal pattern equipment are plus or minus 3 per cent and with wood patterns plus or minus 5 per cent. The weight tolerances on permanent mold castings are plus or minus 2 per cent.

For roughing cuts speeds of 500 to 700 feet per minute and a feed of 1/16-inch to 3/32-inch are recommended, according to the nature of the work. No lubrication is recommended for roughing. For extra fine finish a speed of about 125 feet per minute is recommended, but speeds up to 600 feet can be used and satisfactory finish obtained. For turning, the finishing feeds should be from 0.01-inch to 0.125-inch, and for planing up to 0.25-inch. A good lubrication mixture for finishing is 70 parts kerosene and 30 parts lard oil.

Effect of Aging

Nearly all aluminum alloy castings change in physical properties at room temperature after casting. This change in properties is called "aging" and is caused by the same internal changes which change the properties of the alloys by heat treatment. The general effect of aging is to increase tensile strength and decrease elongation.

In general, the tensile strength and elongation of the aluminum alloys decrease as the thickness of the section increases. As a general rule, the more quickly aluminum alloys solidify the smaller the grain size and the higher the tensile strength and elongation. No. 12 alloy, for example, when cast in large sections in sand may have a tensile strength as low as 14,000 pounds per square inch and an elongation of less than 1 per cent.

As an engineering metal aluminum is in a class by itself because of its low specific gravity. Its use is determined by many factors, among which are the following:

Where lightness is of prime importance, aluminum in sheet form has about seven times the stiffness of steel for equal weights. For a given rigidity in any metal structure aluminum will weigh less than any other metal used in engineering. For such parts, therefore, as airplane engine crankcases, camshaft housings, oilpans, etc., where lightness and rigidity are of prime importance, aluminum alloys find extensive use.

In the manufacture of gas engine crankcases it is found that the aluminum castings can be machined about three times as rapidly as cast iron parts, and consequently the first cost of plant installation and labor cost of machining is greatly decreased by the substitution of aluminum for cast iron. The lightness of the crankcase is the chief advantage because the weight of the engine per horsepower is reduced.

Where the lightness of reciprocating parts, like pistons, is of great moment, such as in high speed gas engines, the use of aluminum is very beneficial. The aluminum piston also has the advantage of high heat conductivity, which is sometimes of greater importance in a gas engine than reduction in weight.

For reducing unsprung weight in motor vehicles, aluminum is particularly valuable. This includes such parts as differential carriers, rear-axle housings, brake shoes, hub caps, wheels, etc.

Aluminum alloys, especially with moderate pressures, function nicely as bearings against hardened steel. As an example, the liberty engine camshaft was run in aluminum bearings, as were also the rocker arms. Aluminum alloys, however, do not bear well against soft steel.

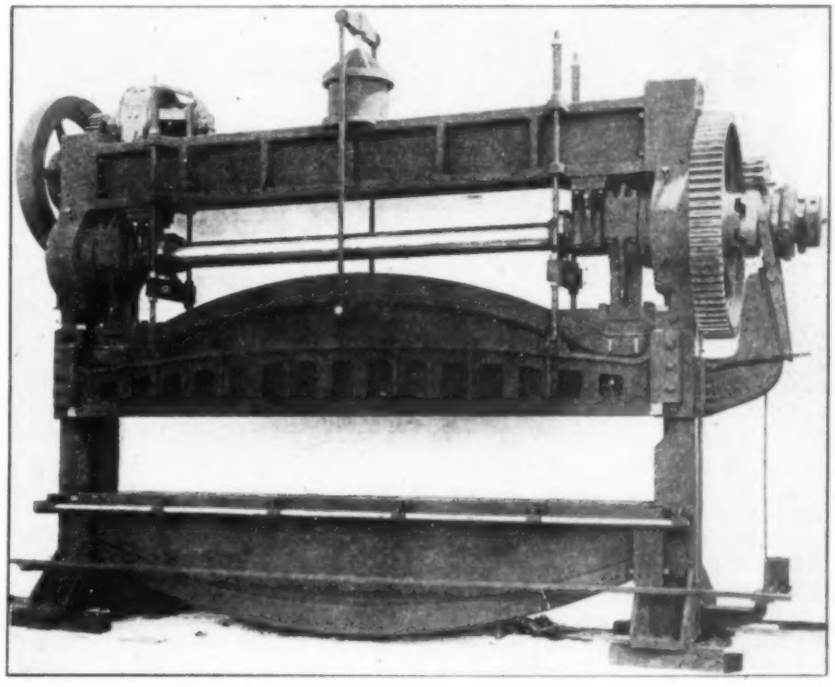
For equal volumes aluminum is cheaper than brass or bronze. Aluminum alloys find extensive use as a substitute for brass and bronze castings where freedom from atmospheric corrosion is of prime importance and where the strength requirements are not too severe.

Selection of Alloy

For aluminum castings not highly stressed, No. 12 alloy should be used. Where freedom from leaks is the main requirement, the 12 per cent copper alloy is good and the more ductile zinc alloy should be used for highly stressed parts. Present day engineering materials are required to stand abuse rather than normal use. Ductility is essential if an alloy is to stand abuse, and this is the main reason for the use of the aluminum alloy containing 2.75 per cent copper, 1.5 per cent iron and 7 per cent zinc.

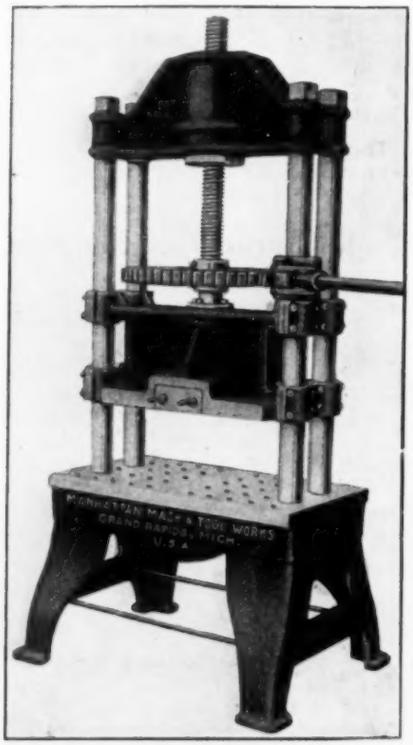
Builds Large Press for Side Rail Punching

For punching side rails for automobiles, the Williams, White & Co., Moline, Ill., have recently constructed a large straight side press having a capacity of 600,000 pounds distributed load. Special attention was given in designing this machine for balance, rigidity and strength. The clear distance between housings, as shown in the accompanying illustration, is 16 feet, the vertical die space with ram down, 24 inches and the length of the stroke, 5 inches.



ELECTRIC POWER PRESS WHICH PUNCHES AUTOMOBILE SIDE RAILS

Width of the table is 24 inches and the ram 16 inches. The air counterbalance is designed to operate at 80 to 100 pounds pressure. Adjustable front and rear clamping strippers and side clamping devices actuated from the main shaft are provided. Normal operating speed is 25 strokes per minute, the power being furnished by a direct-connected, 50-horsepower, direct-current motor running at a speed of 775 revolutions per minute. The side housings of the press are of cast steel while the other members of the frame are semisteel. A friction slip flywheel is provided to protect the machine, when



FOUR-POST CONSTRUCTION GIVES THIS PRESS UNUSUAL RIGIDITY

dies are jammed, by allowing the flywheel momentarily to continue rotation against friction, thus gradually dissipating the energy it contains.

The pendulums oscillate in steel thrust blocks set into the ram. An automatic stop clutch has an automatic throwout which when the treadle is released, leaves the ram at the top of its stroke and prevents repetition. The treadle may be hooked down for continuous operation or may be depressed for each stroke.

Develops Four-Post Screw Press for Toolmakers

A new type of 4-post screw press of heavy construction has been developed by the Manhattan Machine & Tool Works, Grand Rapids, Mich. As shown in the accompanying illustration the press consists of a base, top casting, four supports and a ram. On account of the rigidity due to the 4-post construction this press accommodates a heavier class of work than can be performed on a 2-post machine. The capacity of the press is 80 tons; the size of the bed, 20 x 36 inches; space between standards, 26 inches, and maximum height from bed to ram, 22 inches.

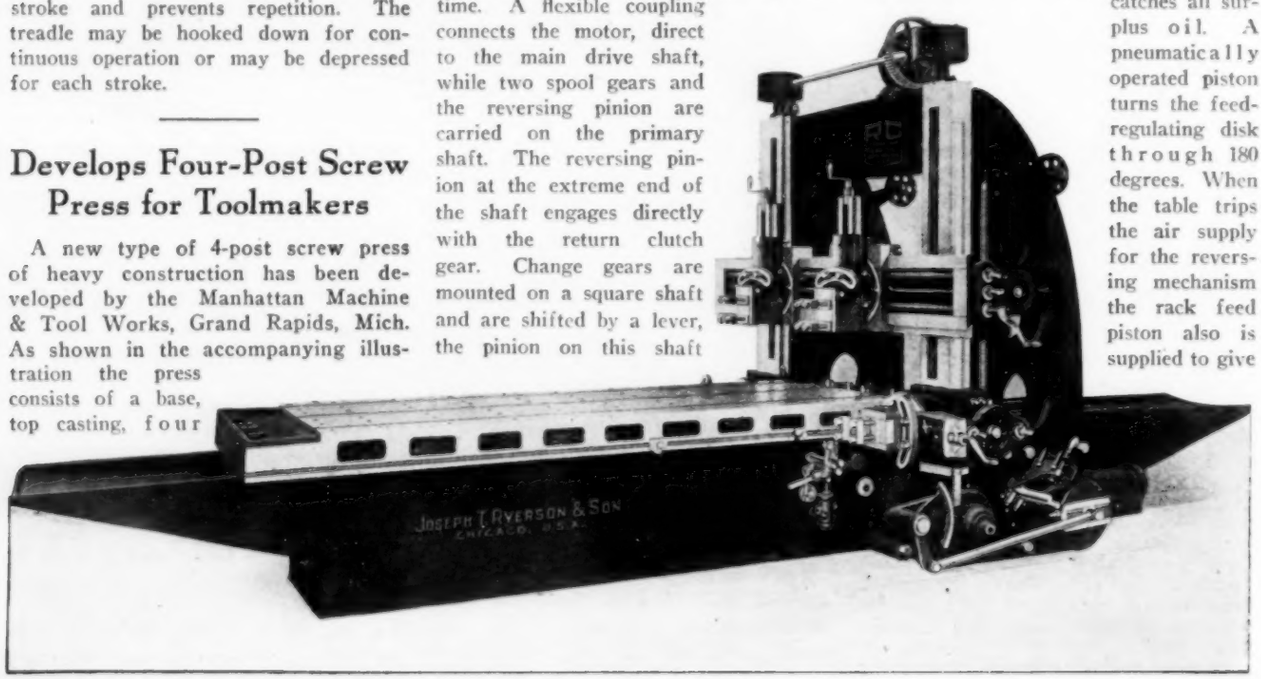
Announcement has been made by officials of the Riverside plant of the National Tube Co. at Benwood, W. Va., that arrangements have been made by the company to build or buy dwellings for all of the workmen of that plant who wish to avail themselves of the opportunity. Employes will be permitted to pay for homes on an installment plan with 5 per cent interest to be charged on deferred payments and 12 years to be allowed for making payments. The Riverside plant has almost 3000 employes.

Introduces Novel Reversing Device in New High Power Planing Machine

ELIMINATION of high speed reversing parts has been accomplished in the high power multispeed planing machine shown in the accompanying illustration. This machine is manufactured by the Conradson Machine Tool Co., and is being handled by Joseph T. Ryerson & Son, Chicago. The usual reversing motor and shifting belts have been supplanted by annular pneumatic clutches actuated by a distributing valve tripped by dogs on the platen. These are self-compensating for wear. Designed for motor drive, the planer is equally adaptable for constant speed single pulley drive. The problem of inertia in high speed parts is said to have been eliminated in the process of reversing the table. Four cutting speeds are possible, 25, 30, 37½ and 45 feet per minute, while the return speed is 100 feet in that time. A flexible coupling connects the motor, direct to the main drive shaft, while two spool gears and the reversing pinion are carried on the primary shaft. The reversing pinion at the extreme end of the shaft engages directly with the return clutch gear. Change gears are mounted on a square shaft and are shifted by a lever, the pinion on this shaft meshing with the forward clutch gear. As referred to above, the dogs on the platen trip the distributing valve which admits air alternately to the clutches and a spacing rod prevents locking of the drive gearing. Back gears, bullwheel and rack are of herringbone design, resulting in smooth operation, resistance to wear, reduction of backlash, and increased strength of teeth. These gears are hobbed from the solid.

The box type bed has v's with a supporting surface inclined 15 degrees to the horizontal, which gives an oil film. The inner leg is inclined 15 degrees to the vertical and acts as a guide. All are proportioned to compensate for wear.

Lubrication of the ways is by oil carried up by the bullwheel. An apron at each end of the bed extends beyond the maximum travel of the table and catches all surplus oil. A pneumatically operated piston turns the feed-regulating disk through 180 degrees. When the table trips the air supply for the reversing mechanism the rack feed piston also is supplied to give



IN REVERSING THIS PLANER, ANNULAR PNEUMATIC CLUTCHES ACTUATED BY A DISTRIBUTING VALVE TRIPPED BY DOGS ON THE PLATEN SUPPLANT THE USUAL REVERSING MOTOR AND SHIFTING BELTS

change of speed. Elevating screws are driven by a motor mounted on a cross girt, spur reduction gears and bevel gears acting directly on the elevating screw. Air at 80 to 100 pounds pressure is required and the consumption in ordinary work is 3 to 10 cubic feet per minute according to the size of the planers. When compressed air is not available a small standard compressor may be connected directly to the main drive shaft.

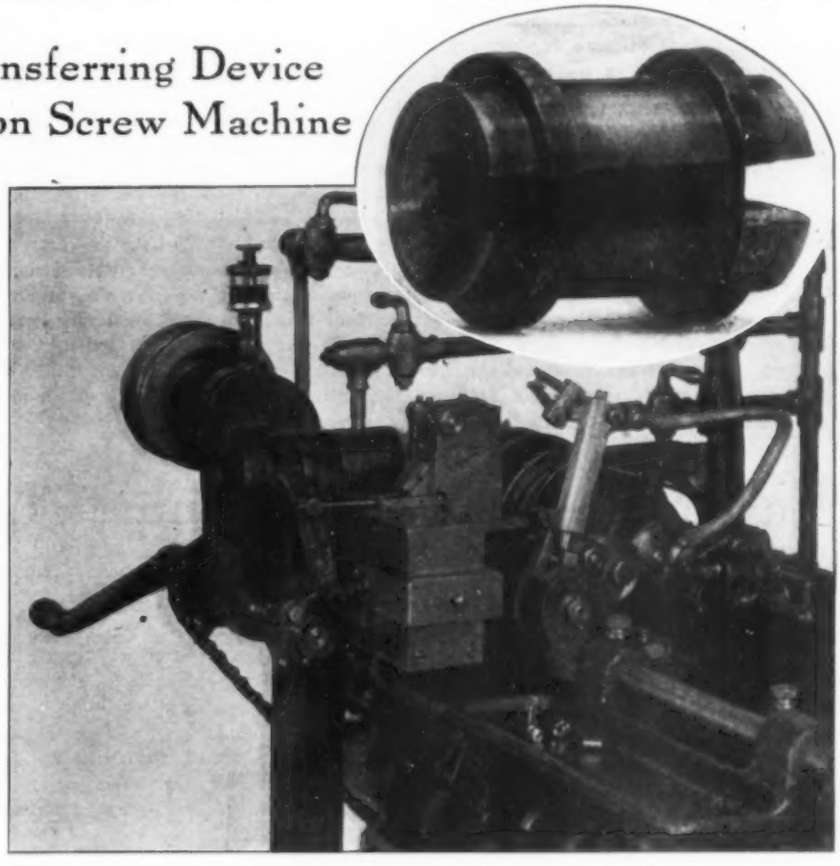
The National Tube Co., Pittsburgh, has started work on 26 new houses for use of its employes at its Ellwood City, Pa., works. The buildings are going up in the Wayne Park section and are expected to be ready for occupancy in six months.

Novel Automatic Transferring Device Speeds Production on Screw Machine

IN DEVELOPING special tools and attachments for machining a small brass key bearing, the automatic screw machine department of the Brown & Sharpe Mfg. Co., Providence, R. I., developed an unusual automatic transfering device which greatly facilitates the handling of the work on a screw machine. The pieces, one of which is shown in Fig. 1, are made of common yellow brass and are cut from bar stock and completely machined automatically at the rate of 1080 per hour, including the slotting operation.

The stock is fed forward automatically after each piece has been cut off. A circular forming tool, shown in the illustration, forms the blank. The concave portion on the end of the key bearing is drilled with a stock drill held in the stockholder on the stockholder slide. Just before each piece is cut off it is gripped by two fingers of a transferring arm which is shown in the raised position in the photograph.

As the transfer arm moves from right to left, the fingers are caused to revolve through 180 degrees by a rack which is operated by a cam. This brings the piece to the left of the machine when facing, as in the photograph, and permits the transfer of the piece from these fingers to receiving clips in the box-like attachment shown. From here the piece is carried down a chute and onto a traveling belt which firmly holds it in under a slotting saw. The finished pieces are carried on and dropped into a receiving pan at the end of the machine.



AUTOMATIC SCREW MACHINE WITH SPECIAL ATTACHMENTS FOR MAKING THE SLOTTED KEY BEARING SHOWN IN THE INSERT. EACH PIECE IS AUTOMATICALLY CARRIED BY TRANSFER ARM FROM THE FIRST OPERATION AT THE RIGHT TO THE SECOND OPERATION AT THE LEFT

Wants American Engines

Maurice Schlossberg, representative of a company just organized to establish a regular air service between New York and Buenos Aires, has come to New York to buy American engines, as well as a complete plane in which he intends to make the first air trip between New York and Buenos Aires. He is making his headquarters at the office of the Smith-Eisemann Corp. of America, 217 Broadway, New York. The new company, for which Mr. Schlossberg is acting as chief pilot and foreign representative, is the Buenos Aires Punta Arenas Aviacion Co., which has a capitalization of 5,000,000 pesos and already has established a regular service between Buenos Aires and Punta Arenas, Chile, which cities are 2000 miles apart as the crow flies. Mr. Schlossberg expects that the New York-Buenos Aires trip can be made in 36 hours. Mr. Schlossberg reports that flying is gaining in popularity in South America and that many suburban residents now fly to Buenos Aires instead of using the railways which are not as well or as frequently run as those in the United States. Mr. Schlossberg's purchases will be handled by the Smith-Eisemann Corp. of America.

Sells Bearing Compound

The M. T. K. Sales Corp. has been organized at Rochester, N. Y., and incorporated under the laws of New York state to distribute a new bearing abrasive which is intended to eliminate the necessity of scraping bearings. The product is manufactured by the M. T. K. Products Co., Seattle, Wash., which, it is understood, contemplates moving its plant to the East in the near future. The bearing compound already has found a wide market in the marine and automobile fields. A peculiar feature of the abrasive is that it will not cut iron or steel and hence will not injure shafts or other working parts, and after a few minutes of cutting, it breaks down and becomes a harmless residue incapable of further cutting. The officers of the M. T. K. Sales Corp. are: President, Benjamin C. Mathes, Mathes Sales & Mfg. Co., Rochester; vice president and consulting engineer, William D. Jones, formerly of the Symington-Anderson Co.; secretary, Willis P. Anderson.

Engineers Discuss Timely Topics

American Society of Mechanical Engineers in Spring Meeting at St. Louis Weighs Problems of Valuation, Industrial Housing, River Transportation, Etc.— Hold Technical Sessions on Castings and Aeronautics

HERBERT HOOVER'S belief that the work of the engineer should extend beyond the narrow limits of pure engineering was well exemplified in the program of the spring meeting of the American Society of Mechanical Engineers, held last week at the Hotel Statler, St. Louis. Industrial housing, valuation and appraisal of industrial properties and public utilities, establishing a government department of public works, and kindred subjects dominated the program. The outstanding technical session of the convention was that on castings, held Wednesday morning, when a symposium of six papers was discussed. A number of miscellaneous topics, including power and combustion, development of river transportation, aeronautics, screw threads, flow of air and gases, heat transmission, etc., were discussed. Two interesting addresses by officers of the ordnance department of the United States army were delivered during the convention. A proposed code of ethics for mechanical engineers, which appears elsewhere in this report, was discussed but not accepted by the members present.

Unlike the fall meetings of the society, when considerable stress is placed upon the technical features of the program, the St. Louis meeting reflected a desire on the part of the executives of the organization to relieve routine of business and technical sessions by introducing numerous entertainment features. On the Sunday preceding the first day of the convention, many members and guests visited the plant of the Mississippi River Power Co., at Keokuk, Iowa, and following the meeting at St. Louis nearly a hundred persons went to Tulsa, Okla., for a two-day program of meetings and inspection trips through the oil country. The entertainment provided at St. Louis probably has not been surpassed in recent meetings of the society.

Purchasing Power of Common Laborer Increases

IN LINE with the decision made some time ago to devote attention to the subject of valuation and appraisal, the discussion inaugurated at the meeting in New York last December was supplemented by five papers delivered at special sessions held Monday and Tuesday at St. Louis. In a paper entitled, "Price Levels in Relation to Value," Cecil F. Elmes, Sanderson & Porter, Chicago, presented a comprehensive study of the history of commodity prices. Mr. Elmes declared that low commodity prices, while superficially desirable, may in a broad sense be the reverse of a blessing, inasmuch as they signify a shrinkage in demand in commodity markets. On the other hand, high prices, so long as they do not run into panic or famine prices, equally may be by no means an economic evil.

Mode of Living Affects Prices

In discussing the conditions of the working men, Mr. Elmes stated that the laborer's mode of living is without question a large factor in the high prices of today. "Every public spirited citizen," he said, "having the welfare of the community at heart and conversant with the evils of low wages, desires to see labor get just recognition but outside of catastrophic disturbances which we cannot undertake to predict, a belief in lower commodity prices in the immediate future is hard to justify, unless lower wages are taken for granted."

In explanation of this statement, Mr. Elmes exhibited charts showing the buying power of the dollar. As briefly mentioned in these columns last week, he stated that the dollar with 100 per cent purchasing power in 1896, decreased to 77 per cent in 1904, 65 in 1912, 53 in 1916 and 26 in 1920. At the same time, declared Mr. Elmes, the wages for common labor increased from 17 cents per hour in 1896 to 28½ cents in 1904, 40 cents in 1912, 42½ cents in 1916, and 70 cents in 1920. From these figures, he concludes that the relative purchasing power of the laborer was 185 units in 1896, 250 in 1904, 245 in 1912, 275 in 1916 and 250 in 1920. Thus the purchasing power of the laborer, while not as great as in 1916, is considerably greater than in 1896 when the buying power of the dollar was at the maximum for the period.

Referring to improper practice in setting values upon public utilities, Mr. Elmes said:

"I will hazard a guess that future generations may look back with curiosity to some of the practices now in use in valuing railroad property throughout the country. As fast as a railroad completes construction today, with labor and materials purchased and erected today, paid for at the prices of today, the rate-making body proceeds to place a 'valuation' upon the newly completed construction work based not on what it actually cost, not on what any living human being could do it for today, but on the assumption that a magician built the work when labor and materials called up out of the past at the prices current on June 30, 1914. Whatever legitimate use a 'valuation' of the railroads of the country 'as of June 30, 1914' may be thought to have, it would surely seem that this order of 'theorizing' a value constitutes nothing less than a perversion of economic thought.

Setting a Price on Service

"Assuming then, the prices we find actually prevailing in the market today, how shall we set a price upon the service of a public utility? Exactly as we determine the price of any other merchandise. What shall we pay for it? We should pay for it what the service is worth. How shall the worth be measured? In terms of the currency used to pay for it. If the service was worth $100 in 1913, and if $226 in August, 1919, will buy as much of commodities in general as $100 bought in 1913, then public utility service (or any other service) that was worth $100 in 1913, is worth $226 today."

The session of valuation and appraisal reconvened Tuesday afternoon, Fred R. Low, editor, *Power*, New York, presiding. Papers dealing with the subject of valuation were discussed, including "Appraisal and Valuation Methods," by David H. Ray; "Rational Valuation," by James R. Bibbins; "The Construction Period," by H. C. Anderson; and "Data on the Cost of Organizing and Financing a

Public Utility Project," by the late F. B. H. Paine. Considerable discussion centered upon the principles of valuation as outlined in the paper by Mr. Bibbons. The author pointed to the seriousness of the present situation brought about by the failure of engineers to agree upon a code of definition, methods and practices in valuation procedure, especially when ultimate decisions must finally rest upon the shoulders of courts, commissions or nontechnical bodies. A policy of open-minded co-operation research and education along fundamental lines of economics was urged, rather than a continuance of purely partisan methods of thought and action. Following a brief discussion regarding the advisability of appointing a committee to collect and crystalize the subject matter of the various papers presented on valuation and appraisal, a motion was carried authorizing the president to appoint such a committee. A motion designed to establish a permanent committee on valuation and appraisal was not sustained by the members present.

Suggests Plans for Financing Employes' Homes

INDUSTRIAL housing and problems affecting St. Louis and the Mississippi valley were considered at the professional session held Tuesday morning. The housing shortage was discussed by Nelson Cunliff, St. Louis chamber of commerce, and Leslie H. Allen, Fred T. Ley & Co., Inc., Springfield, Mass. Mr. Cunliff explained that according to government figures, 100 families occupied 100 homes in 1890, whereas in 1910, 115 families occupied 100 homes, and in 1920, on an average, 121 families are occupying 100 homes. According to Mr. Cunliff, only 20,000 new houses were built in the United States in 1918, although 20 times that number were needed. In 1919, he said, 70,000 homes were built but meantime, weddings continued at the rate of 1,040,000 a year and the normal increased demand for homes amounted to 1,250,000. Basing his estimate on these and other data, Mr. Cunliff stated that 3,340,000 homes must be built in the United States to re-establish the average of 115 families for every 100 homes which existed prior to the conclusion of the war.

Mr. Allen confined his remarks principally to the financial aspects of the industrial housing problem. He claimed that the housing shortage is partly due to the fear of a financial panic and partly to the fact that rents, high as they are, are not high enough to show an adequate return to present day construction costs.

Referring to methods of financing home construction, Mr. Allen said that the ultimate purchaser usually cannot make a large initial payment and his earnings do not permit very large monthly payments on the amount he borrows. Banks are appraising for first mortgage loans very conservatively, it being impossible to obtain more than 50 per cent of the cost of the house and lot from this source. Therefore, there is a balance of about 40 per cent which the employer must be prepared to advance in cash or credit and he must face the possibility of this proportion being tied up for a long period.

Mr. Allen stated that in many states combinations of manufacturers and merchants have been formed to organize loan associations or mortgage finance corporations to lend money on second mortgage to the workmen who wish to build homes. The main defect in this plan, declared Mr. Allen, is that all of the risk is placed upon the individual.

The author explained in detail the principles of co-operative housing. Under this system a company is organized to purchase and develop real estate and the stockholders are admitted as tenants to the property. Each man purchases stock to the value of half the cost of his house and land, the other being carried by the mortgage of the whole property. His rent amortizes the mortgage in from seven to 12 years and then the housing company can either reduce rents or pay large dividends. To apply this system to the housing of the working classes would necessitate the placing of blocks of stock in the hands of employers and charging enough rent to pay for the purchase of the stock by tenants from the stockholders in monthly or annual in-

Proposed Code of Ethics for Mechanical Engineers

THE mechanical engineer should be guided in all his relations by the highest principles of honor, of fidelity to his client, and of loyalty to his country.

2. His first duty is to serve the public with his specialized skill. In promoting the welfare of society as a whole he advances his own best interests, as well as those of the whole engineering profession.

3. He should consider the protection of his client's or employer's interests in professional matters his essential obligation, provided these interests do not conflict with the public welfare.

4. He shall refrain from associating himself or continuing to be associated with any enterprise of questionable or illegitimate character.

5. He can honorably accept compensation, financial or otherwise, from only one interested party unless all parties have agreed to his recompense from other interested parties.

6. He must inform his clients of any business connections, interests or circumstances, such as might influence his judgment or the quality of his services to his clients.

7. He must not receive, directly or indirectly, any royalty, gratuity or commission on any patented article or process used in the work upon which he is retained without the consent of his clients or employers.

8. He should satisfy himself before taking over the work of another consulting engineer that good and sufficient reasons exist for making the change.

9. He must base all reports and expert testimony on facts or upon theories founded only on sound engineering principles and experience.

10. He must not regard as his own any information which is not common knowledge or public property, but which he obtained confidentially from a client or while engaged as an employee. He is, however, justified in using such data or information in his own private practice as forming part of his professional experience.

11. He should do everything in his power to prevent sensational, exaggerated or unwarranted statements about engineering work being made through the public press. First descriptions of new inventions, processes, etc., for publication should be furnished only to the engineering societies or to the technical press.

12. He should not advertise in an undignified, sensational or misleading manner, or offer commissions for professional work, or otherwise improperly solicit it.

13. He should not compete knowingly with a fellow-engineer for employment on the basis of professional charges or attempt to supplant a fellow-engineer after definite steps have been taken toward the other's employment.

14. He should assist all his fellow-engineers by exchange of general information and valuable experience or by instruction through the engineering societies, the schools of applied science, and the technical press.

stallments instead of selling the whole of the stock to the tenants at the start. According to Mr. Allen, the scheme of co-operative housing may be the solution of America's housing problems.

A marked revival in the campaign for developing river transportation was reflected by the interest shown in two papers on Mississippi river navigation presented at the Tuesday morning session. E. W. Shadek, vice president, Ruemmeli-Dawley Mfg. Co., St. Louis, reviewed the recent progress in the construction of barges and towboats for river transportation and outlined the provisions made for their operation. According to Mr. Shadek, traffic by rail in the Mississippi valley has long since reached the capacity of the railroads. He enumerated the improvements covered by the Newton bill now pending in congress and listed the towboats and barges already under construction for use on the various inland water ways of the country. According to the author, appropriations for river projects made since 1896 aggregate $688,427,509. William S. Mitchell, United States engineers office, St. Louis, presented a paper dealing principally with the design of an ore fleet for the upper Mississippi river. Mr. Mitchell stated that in May, 1917, an attempt was made to carry ore from the Minnesota fields to St. Louis in a small improvised fleet composed of vessels belonging to the engineers department. Several steel barges and a stern paddle wheel towboat were assigned to carry 3000 tons of Illinois coal to St. Paul. The fleet left St. Louis July 31 and arrived at the destination in the middle of August. Considerable delay ensued at St. Paul in unloading the unusual amount of coal and in obtaining and loading the ore for the return trip. During this time the river stage fell steadily. The fleet, with about 3400 tons of ore, left St. Paul, Aug. 28, and although the draught of the barges was at the extreme limit permitted by the channel depths, they were floated over shoals and bars with fair success. The towboat, however, built for deeper water grounded frequently. It required two months of incessant effort to get the fleet to St. Louis.

Explain Properties of Castings to Engineers

SPECIFYING the proper castings for various engineering requirements was the chief topic discussed at the simultaneous sessions held Wednesday morning. A symposium on castings, comprising six papers dealing with malleable, die, aluminum, steel gray iron and brass castings was presented at a special session. Frank O. Wells, president of the Greenfield Tap & Die Corp., Greenfield, Mass., presided. The symposium is published on pages 1617-1623 of this issue.

Richard Moldenke, Watchung, N. J., opened the discussion with a paper on gray iron castings, in which he emphasized the fact that castings of this material can be produced to meet a wide variety of requirements. He also pointed to the use of high proportions of scrap in the cupola during the war and declared that this practice will be paid for within the next 20 years when the high-sulphur and oxidized iron will return from the scrap piles to be used again. This problem will be met, he said, either by using an increased amount of pig iron or by developing a practical desulphurizing process. Suitable desulphurization can be had by melting in the cupola and transferring the charge to a basic-lined electric furnace.

Hold Aeronautics Session

The subject of shrinkage of steel castings was discussed in connection with a paper by John H. Hall, Taylor & Wharton Steel Co., High Bridge, N. J. Arthur M. Greene, Rensselear Polytechnic institute, Troy, N. Y., read a paper prepared by Prof. Enrique Touceda on malleable castings. Capt. J. L. Hughes, ordnance department, United States army, explained experiments made by the government with malleable bombs, stating that difficulty was found in eliminating porosity. Charles Pack, Doehler Die Casting Co., Brooklyn, N. Y., discussed recent developments in die casting and in the absence of Zay Jeffries, Aluminum Castings Co., Cleveland, presented the latter's paper on aluminum castings. The subject of permanent molds came up for considerable discussion, the opinion seeming to prevail that investigators should search for "long-life" molds instead of "permanent" molds.

Papers on the theory and design of airplanes were read at a session on aeronautics held Wednesday morning. Thursday morning the society held a joint scientific session with the American Society of Refrigerating Engineers and American Society of Heating and Ventilating Engineers. One of the most important papers presented at the meetings of the latter organization was one on the theory of heat losses from pipes, by John R. Allen, in charge of the societies' research laboratory at Pittsburgh. Mr. Allen stated that instead of using a heavy insulation of asbestos for pipes, better results are obtained at a lower cost by using a light insulation of asbestos surrounded by air space.

Thursday evening nearly 100 members and guests of the American Society of Mechanical Engineers went to Tulsa, Okla. At a professional session held jointly with the mid-continent section of the society and the Oklahoma section of the American Chemical society Friday afternoon, eight papers dealing with oil and gas problems were presented. At a banquet held at the Hotel Tulsa, Friday evening, addresses were delivered by Col. Clarence B. Douglas, Tulsa; E. S. Carman, Osborne Mfg. Co., Cleveland; Dean P. F. Walker, University of Kansas, Lawrence, Kans.; and Pat Malloy, president, Western Refiners association.

Entertainment Features

The entertainment features provided at St. Louis comprised numerous inspection trips to industrial plants, including those of the Commonwealth Steel Co., Union Electric Light & Power Co., St. Louis Boat & Engineering Co., General Motors Corp., Wagner Electric Co., Heine Safety Boiler Co., Anheuser-Busch Brewing association, Busch-Sulzer Bros. Diesel Engine Co., Mississippi Valley Iron Co., and Laclede Gas Light Co.

At a banquet held Tuesday evening, at the Missouri Athletic club, Lieut. Col. H. W. Miller, ordnance department, United States army, described the German coast defenses in Belgium. He declared that as a result of experience gained during the war, the Atlantic coast can be made almost impregnable to attack from sea at a moderate cost if most of the artillery is mounted on railway carriages and simple emplacements are provided at points along the coast. A special entertainment was given Wednesday night at the municipal open air theater, Forest Park.

Catalogs, circulars, etc., relating to anything in which it might be interested are desired by the Cleveland Twist Drill Co., Cleveland, which is revising its catalog library.

Men of the Machinery Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

C. N. HESS, who has been affiliated with the W. M. Pattison Supply Co., Cleveland, for the past 23 years, the major portion of that time as manager of the machinery department, has resigned, effective June 15. He with C. F. Schenck has formed the Hess-Schenck Co., 221 St. Clair avenue N. E., that city, to deal in new and used machinery.

George A. Price recently was elected treasurer of the American Arch Co., 30 Church street, New York.

M. D. Goodman has been placed in charge of the branch office recently established at room 370, 49 Federal street, Boston, by the Electric Controller & Mfg. Co., 2700 East Seventy-ninth street, Cleveland.

Harry A. Hey recently became manager of sales in the eastern territory for the Illinois Tool Works, Chicago, with headquarters in New York City. He formerly was connected with the Singer Mfg. Co., Elizabeth, N. J.

Edward N. Hurley Jr. has retired from the board of directors of the Hurley Machine Co., Chicago, and has been succeeded by B. E. Sunny, president of the Chicago Telephone Co., that city.

Fred C. Gilbert has been elected president and treasurer of the new Vulcan Motor Axle Co., Detroit. The company is capitalized at $1,000,000 and will build a complete line of motor vehicle axles. Machinery and equipment are being installed.

F. R. Bolles was recently elected vice president and general manager of the American Automatic Connector Co., Cleveland. He formerly was vice president and general manager of the Copper Range railroad, Houghton, Mich.

H. G. Weidenthal, formerly vice president of the consulting engineering firm of the James H. Herron Co., 1360-1364 West Third street, Cleveland, has resigned to go into business for himself as a consulting engineer. His address is 458 Hippodrome Annex, 715 Prospect avenue, that city.

W. F. Meyer has been appointed directing transmission engineer for the Hyatt Roller Bearings Co. In his new position, Mr. Meyer, who has been doing field work with the Hyatt agents throughout the country for the past two years, will be in charge of the sale of line shaft roller bearings.

George Baily, formerly manager of supply division of the Cincinnati office of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed industrial assistant to the manager of the supply department of the company at East Pittsburgh. He succeeds T. J. Pace who recently was promoted to the position of assistant manager of the supply department of the company. Mr. Baily is a native of Baltimore and a graduate of Lehigh university, class of 1904, as a civil engineer. He has been with the Westinghouse company since 1913. Mr. Pace has been with the Westinghouse and allied interests for about 20 years.

J. M. Cook, with headquarters in the general office of the Republic Tool & Mfg. Co., Cleveland, has been appointed sales and main representative of the Waltham Grinding Wheel Co., Waltham, Mass., the Republic company being its selling agent. Mr. Cook formerly was sales representative of the Norton Co., Worcester.

L. Keener, who for 11 years, with the exception of the time he spent in army service in this country and France, has been affiliated with the Wayne Machinery Co., Fort Wayne, Ind., has been placed in charge of the branch store recently opened by that company in Louisville, Ky., at 121 South Third street.

D. Clinton Grove, formerly in charge of advertising for the Diehl Mfg. Co., Elizabeth, N. J., builder of motors, and now associated with the Ingersoll-Rand Co., 11 Broadway, New York City, manufacturer of pneumatic equipment, assumed, June 1, duties of advertising manager of the Blaw-Knox Co., Pittsburgh. The latter company manufactures clamshell buckets and fabricated steel specialties.

G. E. Ellis recently became chief engineer of the foreign department of the Casale Safety Devices Co., Inc., New York City. Prior to becoming executive secretary of the Automatic Train Control committee, he was senior signal engineer of the division of safety of the interstate commerce commission at Washington. A. G. Shaver, who at one time was secretary and treasurer of the Hallet Iron Works, Chicago, and who latterly has been a consulting signal and electrical engineer, with headquarters in that city, has been appointed chief engineer of the Casale Safety Device Co., Inc.

E. M. Herr, president of the Westinghouse Electric & Mfg. Co., East Pittsburgh, recently was decorated with the Order of the Rising Sun by the emperor of Japan.

D. B. Franklin, Whitesburg, Ky., recently returned from France where he saw active service during the war. For years he was connected with the Excelsior Machinery Co., Atlanta, Ga., in Kentucky territory.

Charles F. Lederer, until recently superintendent of way, of the Milwaukee Electric Railway & Light Co., Milwaukee, has become associated with the rail welding department of the Metal & Thermit Corp., New York. He entered the track department of the Milwaukee Electric Railway & Light Co. in April, 1908, and was soon promoted to construction gang foreman. In 1904 he was appointed division roadmaster and in 1912 became city roadmaster. In May, 1919, he rose to assistant superintendent, and in September, 1919, became superintendent of way, where he obtained much experience in thermit welding.

Walter M. Coxe has been promoted to mechanical superintendent of plant D of the New Departure Mfg. Co., Meriden, Conn., following a period of service at plant A, Bristol, Conn., where he had been connected with the mechanical department of buildings Nos. 11 and 16. Carl F. Baldwin has been promoted to be assistant mechanical superintendent of plant D of the New Departure company. He likewise was previously associated with plant A, at Bristol. John F. Lang has been promoted to be production superintendent of plant D. He formerly was employed in the office of division manager at that plant.

Men of the Iron Trade

Personal News of a Business Character Regarding the Men of Affairs of the Industry

HARRY D. CARSON, whose resignation from Rogers, Brown & Co., Philadelphia, was noted in the May 6 issue of THE IRON TRADE REVIEW, recently organized Carson & Co., Pennsylvania building, that city. The new company conducts a general brokerage business, handling foundry and steel mill supplies, including pig iron, coke and ferroalloys. Early in 1919, Mr. Carson severed an important connection with the Rogers-Brown Iron Co., Buffalo, to accept the position with Rogers, Brown & Co. His identification with Rogers, Brown interests dates back about 20 years.

George Pohl has purchased the interest of J. E. Fogarty in the Keystone Foundry Co., Plymouth, Ind.

William H. Kochenderfer, formerly with the Southwark Foundry Co., Philadelphia, has been made general manager of the Chambersburg Foundry & Machine Co., Chambersburg, Pa.

W. W. Hearne, vice president of the Mathew Addy Co., in charge of that company's Philadelphia office, is expected to return from Europe next week on the steamship KROONLAND.

I. Lamont Hughes has resumed his duties as general superintendent of the Carnegie Steel Co., in the Youngstown district, after a rather severe illness following an operation for appendicitis.

John Gillen, who has been merchant sales manager at Chicago for many years for the Standard Gage Steel Co., Beaver Falls, Pa., has resigned his position and after a vacation and rest will engage in other business.

Henry G. Doering, who has been connected with the Napier Saw Works, Springfield, Mass., has accepted the position of sales manager of the Trueson Laboratories, Detroit, and will take up his duties early in June.

Ernest E. Bell, vice president of the Hydraulic Steel Co., Cleveland, addressed the Association of Pittsburgh Credit Men, May 19, at the Chatham hotel, Pittsburgh. The subject of his talk was "Human Relationship in Industry."

M. F. Capron, who for the past five years has been connected with the Carpenter Steel Co., Reading, Pa., in the capacity of mechanical engineer, has resigned that position to become connected with the Shelby Seamless Tube Co., Shelby, O., in the capacity of chief engineer.

Guy D. Leopold has resigned as purchasing agent and traffic manager of the Edgewater Steel Co., Pitts-

HARRY D. CARSON

burgh, to accept the position of general purchasing agent for the Austin Co., Cleveland. Walter McKean, formerly with the Westinghouse Electric & Mfg. Co., succeeds Mr. Leopold.

Mat Riddell, member of the firm of Watson Gow & Co., ironfounders, Falkirk, Scotland, was nominated for the office of president by the general council at the same meeting. The election will take place at the annual convention which will be held at Glasgow, Aug. 27, 28 and 29.

W. C. Coryell, recently appointed chief engineer of the General Fireproofing Co., Youngstown, O., formerly was with the Carnegie Steel Co. at Youngstown in the capacity of steam engineer. He went into the business of consulting engineer for himself in 1912.

L. O. Benner is manager of the pressed steel wheel division of the newly-organized Motor Wheel Corp., Lansing, Mich., and C. C. Richardson is purchasing agent. The company is a combination of four of the largest wood and steel wheel factories in the country. H. F. Harper is president and general manager.

W. K. Kenly, formerly purchasing agent for the Interstate Iron & Steel Co., Chicago, has become affiliated with the James S. Miller Co., McCormick building, Chicago, dealer in scrap iron and steel and railway supplies. He will be in charge of the Miller company's ferroalloys department.

Henry Berlinger, who has had a wide experience in the nonferrous metals trade, has become affiliated with the Sandusky Foundry & Machine Co., Sandusky, O. He will develop business in new lines for that company's fluid compressed bronze castings and in the purchase of nonferrous metals.

W. F. Thurmond, of Jones & Thermond, 25 Broad street, New York City, has purchased the interest of John W. Rapp and associates in the Empire Tube & Steel Corp., College Point, Long Island, N. Y. Mr. Thurmond and his associates now own the entire capital stock of that company. John W. Rapp and A. J. Connell have resigned from its board of directors.

S. H. Cleland has been appointed eastern sales manager with temporary offices at 15 East Fortieth street, New York, for the National Engineering Co., Chicago. He has had considerable experience in connection with molding sand, core binders and foundry and sand mixing equipment. Branch offices at Erie, Pa., Harrisburg, Pa., and Boston will be operated under his supervision.

C. P. Paisley, secretary to A. A. Corey, president of the Cambria Steel Co., Johnstown, Pa., has been transferred to general offices of the company at Philadelphia, now the headquarters of President Corey. Mr. Paisley has been associated with Mr. Corey for several years, having been with the latter when he was at the Homestead works of the Carnegie Steel Co.

(*Concluded from Page* 1597)

The coastwise shipments from Middlesborough during April reached 24,905 tons, of which 18,090 tons were pig iron. The greater quantity, 8522 tons, went to the east of Scotland, a falling off of 4591 tons compared with March. Wales during April absorbed 6095 tons and the Tyne 2598 tons.

The imports of foreign ore were heavy in April. Freights have been easier, £1 10s 6d ($5.75) per ton being the quotation paid at the end of the month for best Rubio ore c.i.f., which makes the price work out about £3 3s 6d ($12.12) per ton at Middlesborough. Anticipations that freights would continue to fall were realized by the figure declining to £1 9s ($5.56) which was reported during the first few days of May. The Spanish ore imports were greater in April than for any other month for several years, totaling 209,399 tons. In March the total imports reached 123,276 tons. In March and April, 1919, the respective totals were 108,101 and 82,543 tons. In February of this year the total quantity of ore imported was 87,432 tons and in January 124,497 tons. Up to May 3, the ore imports for the month totaled 16,432 tons compared with 26,836 tons handled to the same date in April. With freights at £1 9s ($5.56), the best Rubio will range about £3 1s ($11.74) per ton.

Belgium Lighting More Blast Furnaces

European Staff Correspondence

BRUSSELS, May 10.—As a result of the readjustment of prices in France May 1, those of Belgium still indicate that this country is more favorably situated for quick production and delivery than its neighbor where strikes begun on May day continue and production is considerably curtailed.

Coal is arriving from the Ruhr at the rate of 2000 tons per day, and more liberal shipments are promised. As a result at least six more blast furnaces will be lighted.

Transactions are relatively scarce owing to the difficulties of both consumers and producers in agreeing upon prices and delivery dates. Labor is becoming more insistent for continuous employment.

Belgian pig iron has all but disappeared from the market. The output in March was but 66,000 tons,

Franc—$0.0679

little more than 30 per cent of the production in March, 1913. The tonnage of merchant iron and rolled steel produced in March was but 58 per cent and 58.4 per cent respectively of that in the same month in 1913.

Demands are very heavy for nail wire, and rods, as well as for high grade steel for automobile manufacture, and no orders are accepted for quick delivery.

Plates and sheets are generally offered for delivery in from six to eight months. The Societe Liegeoise, however, is putting two new mills in operation and will produce 2500 tons per month of plates varying from 8 to 20 millimeters in thickness. Important orders for tubes and steel castings are not being accepted because of the great demand.

The Usines Metallurgiques du Hainault are producing more than in 1913. Sambre et Moselle lighted a 450-ton blast furnace in March, and a second is awaiting raw materials sufficient to keep it going. The steel plant and rolling mills of this company is awaiting semifinished supplies. Lack of coal has retarded the operation of the Laminoirs du Marais and the Laminors du Chatelet. At Chatelet, also, the Hauts Fourneaux du Sud has about completed another blast furnace and is acquiring a stock of raw materials for early operation. The Usines de Chatelineau has only its rolling mill in activity. The Usines de Moncheret at Acoz has a blast furnace nearly finished and the blower and electric plant likewise are approaching completion.

Rail Strike Slows Up Output of France

European Staff Correspondence

PARIS, May 10.—No changes in market prices have been made in the past week, and neither have there been any deliveries of finished products on old orders, owing to the railway strike which began May 1. Little freight has been moved, save to clear the tracks for passenger trains. Imports urgently needed are still tied up at the ports, owing to the dock handlers' sympathy strike. All this has aggravated industrial conditions.

Today it was announced that the iron and steel workers in the Lille region are going out for an indefinite period. They have been engaged in fabricating the most necessary material which the liberated regions need for reconstruction. At Arras, Boulogne, Valenciennes, Saint-Amand, Turcoing,

Franc $0.0636

Lille, Roubaix, Vieux Conde and Marchiennes there is a complete stoppage, and this, after 10 days of railway strikes is more than serious and will greatly retard reconstruction.

Certain foundries of the Lille district shut down a week ago owing to lack of fuel. It is now stated that this was brought about by the fact that of their monthly need of 14,000 tons of coke only 91 tons arrived during the month of April.

French imports of pig iron fell from 657,000 tons in 1917 to 92,000 tons in 1919 in the expectation that France with Lorraine would be able to meet most of her own needs. This has not proved to be the case, although it has served to some extent to keep dollar and sterling exchange from going higher. Imports of rolled products fell from 1,569,169 tons to 518,374 tons in the same years.

France, neither importing nor producing iron and steel for her current needs, is feeling the effects of a lack of materials more today than ever. With the new import prohibitions going into effect, whereby all luxuries and some necessities are cut off, there will still be a possibility of outside products, notably those of America, coming into the market again if some agreement can be arrived at to stabilize dollar exchange at some figure between 10 and 12 francs, instead of between 15 and 16.

Rail Priorities Plan Postponed

Interstate Commerce Commission Understood to Believe Method Would Complicate Rather Than Improve Present Situation—Attempt to Pool Shipments in Order to Eliminate Unnecessary Switching Likely to be Undertaken

WASHINGTON, June 1.—That no priority orders have been issued by the interstate commerce commission, and that he did not believe any will soon be issued by it, is the statement made in a letter by Commissioner Clyde B. Aitchison to R. L. Welch, general secretary and counsel of the American Petroleum institute. Commissioner Aitchison points out that if conditions remain as they are now priority orders will complicate rather than solve the present difficult transportation situation. He explained that such orders gave preference to certain commodities and, therefore, required selection and segregation of cars handling such commodities in switching yards and increase switching. Depleted crews, it is stated caused by the strike, cannot handle the present burdens at the large terminals and these burdens would be increased if priorities are issued.

The attitude of Commissioner Aitchison appears entirely to discount reports that industries of the country will be subject to priority orders in making shipments and which had caused considerable anxiety among steel producers who have feared that such a regulation would further delay the movement of tonnages which have been held up by the congestion of traffic.

Need for Equipment is Urgent

Instead of the issuance of priority orders an attempt to pool the traffic of the United States so as to eliminate as much classification yard switching as possible will be undertaken, if the railroads and shippers follow a suggestion, made to local car service committees, which has been approved by W. C. Kendall, chairman of the car service commission of the American Railroad association. Recommendation that such pooling be made was submitted to Commissioner Aitchison by M. J. Gormely, director of the division of transportation of the American Petroleum institute. His idea is that if the commission were to point out to shippers the importance of cooperation for the elimination of classification yard switching, it would be rendering the greatest possible aid to eliminate traffic congestion. The letter addressed to Mr. Welch by Mr. Aitchison grew out of a discussion regarding plans to restore transportation conditions as nearly as possible to a normal basis.

During the war, R. H. Aishton, regional director at Chicago, carried pooling to such an extent that hundreds of yard-engine hours were saved in moving export traffic, such as steel, meats and cement. Mr. Gormely was his assistant. Disregard of legal rights of carriers and shippers enabled treatment of traffic as though it had been offered by one railroad, and routed more conveniently, instead of by routes designated by shippers and ahead of freight offered at a later time.

It is believed that the railroads, if and when they can make arrangements among themselves, will be able to accomplish pooling and to move freight in trainloads on schedules to get the greatest tonnage moved with the smallest amount of switching. Mr. Kendall has sent a telegram to the chairman of each of the 30 local car service committees which indicates pooling or consolidating could be done.

It is recognized, however, that restoration of traffic conditions to a satisfactory condition cannot be accomplished until the railroads have obtained their pressing requirements for rolling stock and other equipment, the minimum of which, it has been estimated, would cost approximately $610,000,000. These requirements, it is stated, involve about 3,000,000 tons of steel and it has been indicated that additional orders for the necessary tonnage will be placed as quickly as possible and that the mills will be asked to give them preferential bookings.

Emphasizing the need of the railroads in this direction, Charles H. Markham, president of the Illinois Central railroad, appeared last week for the state commerce commission in connection with the general freight advance case and said that nothing was of greater importance than the immediate placing of orders for cars and locomotives. With proper equipment, he said, railroads can be operated as successfully hereafter as they were previous to government control.

Direct testimony of the railroads has been completed and the hearings have been suspended for the current week by the commission so that shippers may prepare to cross examine the railroad witnesses when the case is resumed next week. After that it is proposed that the shippers shall present their evidence and they in turn will be cross examined by the railroads, marking the conclusions of the hearing and leaving the case in the hands of the commission for consideration. The railroads have asked that the proposed increases become effective Sept. 1, when the government guarantee of a standard return expires.

While reports show that the traffic situation is improving and it is improbable that priority orders will be issued, the railroads in some particulars are following a policy of giving preferential movement. This is indicated by a circular issued by the car service commission urging that the railroads do not neglect to expedite the movement of agricultural implements. They have been urged to give this matter special attention until the present emergency has passed because the implements are essential to the production of foodstuffs. The lateness of the planting season, the circular says, the considerable reduction in farm acreage, the shortage of labor and the serious delays that have already occurred rendered it increasingly important that the shipments of these implements be expedited.

War Prices Are Disputed; Government Sued

Washington, June 1.—Marking the first legal contest over prices fixed by the government for steel during the war, a suit has been filed by the Cambria Steel Co., Johnstown, Pa., against the government in the United States court of claims here which is directed against the navy department to recover $236,673.64, held to be the balance due on rail shipments of 8846 gross tons made to the navy department between March 18, 1918, and Feb. 25, 1919.

These tonnages of rail of various types were allocated to the Cambria Steel Co. and obtained under so-called navy orders from the bureau of supplies and accounts promulgated under the authority of legislative provisions enacted prior to and during the war.

In each rail order the navy department made advanced payments of $35

a ton with the understanding that, as provided in the legislation, prices were to be determined later, assurance being given of a reasonable profit.

On Aug. 2, 1919, according to the steel company's petition, after the steel rails and other products called for by the contract orders had been delivered, the secretary of the navy officially announced that he had fixed a price of $47 a ton for open-hearth, and $45 a ton for bessemer rails to be paid to the company. These prices were those agreed upon by the steel industry and the government for standard steel rails, with the exception of some of the independent makers whose cost of production were greater than others.

Holds Rates Show Too Wide a Discrepancy

Washington, June 1.—A difference in rates running as high as 19 cents per 100 pounds, Examiner F. H. Barclay of the interstate commerce commission says, is too great a distinction between merchant bars and cold-rolled or drawn steel bars, polished bar iron and shafting from Beaver Falls, Pa., and Cumberland, Md., to Galveston, Tex., by the way of New York. In a tentative report in the case of the Texas Carnegie Steel association against the Baltimore & Ohio railroad, *et al.*, he recommends a finding that rates on cold-rolled bars from points of origin to Galveston, rail-and-water by way of New York, are unreasonable because they are 5 cents higher than rates on hot-rolled or merchant steel bars.

The water component between New York and Galveston is the only part of the rate that was under attack. It was 46.5 cents per 100 pounds on cold-rolled or drawn steel bars which are used for machinery shafting and are somewhat more valuable than the other kind of bars, the report says, but not so valuable as the steel which is carried at the same rates as merchant bars.

The Mallory Steamship Co., and Southern Pacific-Atlantic steamship lines declared that there is a greater transportation risk in handling polished steel bars by water than the more valuable bars. Because they are polished they must be covered with grease to prevent action of sea air, and on account of the grease are harder to handle.

Government Coal Control Seen in Rate Plan

Washington, June 1.—Charging that a campaign is under way to return coal to detailed government control, George H. Cushing, managing director of the American Wholesale Coal association, has filed a brief with the senate committee on interstate commerce. It is claimed that the first step in this program is the passage of the proposed Frelinghuysen bill which provides seasonal rates on coal.

The purpose of the bill, according to the brief, is to control distribution. It is asserted that such control also involves control of prices, production, wages, cost of coal land, cost of money to the coal operators and of competition to the extent of saying who may open coal mines and when and where they shall be developed. A statement even more sweeping is made by Mr. Cushing when he says that it is not possible to control the coal business without controlling the business of those who sell supplies to the coal mines and this is held to mean the establishment of the commission form of government not only for the railroads and the coal industry, but all the industries in America.

Decides Switching Case

Washington, June 1.—The interstate commerce commission has handed down a decision dismissing the complaint of the United States Cast Iron Pipe & Foundry Co., Inc. which alleged that performance of railroads of switching and spotting services at other similar industries in the Birmingham, Ala., switching district without charge resulted in undue preference of those industries and unreasonable and undue prejudice to the complainant. It maintains a system of trackage within its plant at Bessemer, Ala., where it performs with its own power the necessary switching and spotting services. The commission held that the operations performed by the complainant are not such as the railroads could or should be required to render and therefore nothing for which compensation or allowance should be paid.

Opens Louisville Store

On June 1, the Wayne Machinery Co., Fort Wayne, Ind., seller of representative lines of woodworking, cooperage, transmission and metal-working machinery, machine tools, etc., opened a store at 121 South Third street, Louisville, Ky. L. Kenner is in active charge. Territory to be served includes Kentucky and southern Indiana, including the cities of New Albany and Jeffersonville.

Sulphate Demand

Keeps Up but Little Spot is Available—Transportation is Factor

New York, May 31.—Despite the fact that the majority of consumers have closed upon their requirements, there still is a fair amount of trading in sulphate of ammonia. As there is a little spot material available, buying is almost entirely for future shipment, the prices involved ranging around $4.50 to $6.50 per 100 pounds. These quotations may be regarded as the nominal market on spot business. Export demand is nil, with prices holding nominally at $6.75 to $7, f.o.b. works. A factor in the scarcity of spot supplies is a marked curtailment of production. Some well-informed interests estimate that the output of sulphate of ammonia at the present time is not running over 35 to 40 per cent of capacity.

Good demand prevails for benzol, toluol and solvent naphtha, but trading is confined almost entirely to spot contracts, and as transportation continues highly unsatisfactory, the extent of this business is not what it otherwise would be. The market on pure benzol continues to hold at 30 to 35½ cents, toluol at 31 to 36½ cents, and solvent naphtha at 25 to 31½ cents. So little business is being taken for future shipment owing to uncertainty as to shipments and prices that it is fairly impossible to establish a forward market.

Some of the leading sellers continue out of the naphthalene market, although they continue to quote prices nominally at 10 to 11 cents, f.o.b. works, for flakes, and 9½ to 10½ cents for balls. Only in isolated instances is business being done at these figures. The bulk of trading, which is being done almost entirely with resellers, is going near 15 cents.

Coke Oven By-Products

Spot

Per Gallon at Producers' Plants

Pure benzol	$0.30 to 35½
Toluol	.31 to 36½
Solvent naphtha	.25 to .31½

Per Pound at Producers' Plants

Phenol	nominal
Napthalene, flake	nominal
Naphthalene, balls	nominal

Per 100 Pounds at Producers' Plants

Sulphate of ammonia	$4.50 to 4.60

Contract

Pure benzol	nominal
Toluol	nominal
Solvent naphtha	nominal

Per Pound at Producers' Plants

Phenol	nominal
Naphthalene, flake	nominal
Naphthalene, balls	nominal

Per 100 Pounds at Producers' Plants

Sulphate of ammonia	$4.50 to $4.60

Here and There in Industry

Live Information Which Records the Expansion of Various Lines of Productive Enterprise

THE incorporation of the Remington Arms Co., under the laws of Delaware, with a capital of $110,000,000, is understood to represent a step in the reorganization of the business and form of the Remington Arms-Union Metallic Cartridge Co., Bridgeport, a Connecticut corporation. The latter company's present outstanding stock is $20,000,000 preferred, and $40,000,000 common stock, and it is understood that some plan of exchange for the old stock into the new will be announced within a short time. The capital of the new company is expected to be divided on the basis of $10,000,000 preferred, and $100,000,000 common, of no par value. Since the war, a large part of the war plant of the Remington Arms-Union Metallic Cartridge Co. has been sold, and steps have been taken to establish the company on a peace basis. While it is not definitely so stated, it is expected that the company will engage in the manufacture of cutlery on a large scale.

* * *

IN AN item on page 1352 of the May 6 issue of THE IRON TRADE REVIEW, the name of the secretary of the Marsh Motor Car Co., Cleveland, was given as H. D. Rowley. It should have been H. D. Crowley.

* * *

WITH offices in Toronto, Montreal and Winnipeg, the Garlock-Walker Machinery Co., Ltd., has been made exclusive agent in Canada for the Rich Tool Co., Railway Exchange building, Chicago.

* * *

OF BRICK and steel construction, the proposed general blacksmith and forge shop for the Chas. Phillips Tool Co., Mannington, W. Va., will be 72 x 86 feet. It will contain five steam hammers from 1100 to 2500-pound capacity for the manufacture of oil well tools.

* * *

RECOGNITION of its war service has been granted the Detroit Stoker Co., Detroit, by the recent award of a certificate of merit by the war department. This certificate is issued "for making prompt deliveries of stokers for government plants and otherwise co-operating with the construction division of the army during the recent war."

* * *

OFFICERS and directors of the Dominion Engineering, Ltd., Montreal, Que., are as follows: President, G. H. Duggan; vice presidents, A. J. Brown, K. C., and Julien C. Smith; secretary-treasurer, R. Montague Davis; W. F. Angus, George Chahoon Jr., Sir Hérbert S. Holt, Phelps Johnson, J. M. McIntyre, Howard Murray, H. Birchard Taylor and F. L. Wanklyn.

* * *

UNDER the laws of Michigan, the Charlevoix Machine & Tool Co., 6337 Charlevoix avenue, Detroit, recently was incorporated with a capital of $20,000. It will conduct a general machine shop business, specializing in the manufacture of special tools, jigs and fixtures. Officers are as follows: President, D. W. Klein; vice president, H. Teel; and secretary and treasurer, E. J. Finkbeiner.

* * *

EXCLUSIVE representation has been given to the James S. Miller Co., McCormick building, Chicago, dealer in scrap iron and steel as well as railway supplies, by the United States Ferro Alloy Corp., New York, the United States Nickle Co., New Brunswick, N. J., and the Guggenheim Mining Co., the latter for fluor spar. Other firms producing alloys also are represented by the Miller company's ferroalloy department.

* * *

INCORPORATED in the state of Indiana, the Kokomo Malleable Co., Kokomo, Ind., has a capital of $350,000, $250,000 common and $100,000 preferred. The following officers have been elected to serve the ensuing year: A. G. Seiberling, president; Edward Bridges, vice president, and Moie Cook, secretary and treasurer. Mr. Bridges also is vice president of the Service Motor Truck Co., Wabash, Ind.

* * *

AUTHORIZATION has been received by the Youngstown Boiler & Tank Co., Youngstown, O., to increase its capital stock from $100,000 to $500,000. This increase has been arranged for the installation of additional mechanical units to more than double the productive capacity of the plant. The company is about a year old; James P. Keane is president; William R. Kirby, vice president, and Charles Vogel, secretary and treasurer.

* * *

ANNOUNCEMENT is made by the Worthington Pump & Machinery Corp., 115 Broadway, New York, that in addition to the hydraulic machinery, which it has manufactured since 1840, it now is prepared to furnish improved waterpower machinery of all capacities for low, medium and high head service, including oil pressure system, water wheel governors and other auxiliaries. It intends to produce hydraulic turbines to meet the highest standards in design, efficiency and workmanship.

* * *

RECENTLY formed with a capital stock of $100,000, of which $50,000 is subscribed, the LeRoy-Broehm Foundry Co., 932 Jefferson avenue, Detroit, will be ready to operate early in June. It has 10,400 square feet of floor space which will be devoted to the production of brass castings. W. W. LeRoy is president and treasurer; F. P. LeRoy, factory manager for the Michigan Lubricator Co., Detroit, is vice president, and C. G. Broehm, formerly with that company, is secretary.

* * *

THE Red Chief Mfg. Co., Inc., Louisville, Ky., recently was organized to succeed the company of the same name, with a capital of $50,000. The company manufactures corn shellers, and grinding mills, and in addition to the class of equipment which in the past was manufactured by the old company, has taken over the line of corn shellers and other machinery formerly manufactured by the Whitman Agricultural Co., St. Louis. The company does not plan to enlarge its facilities at present as it has sufficient capacity. Officers of the new company are: President, A. T. Farnsley; vice president, A. Pfeifer; secretary and treasurer, J. P. Van Winkle, and superintendent, H. L. Gaisser.

Here and There in Industry

Live Information Which Records the Expansion of Various Lines of Productive Enterprise

IN ORDER to increase production to meet the unusual demand for its products, the Cahill Iron Works, Chattanooga, Tenn., will begin erecting a new plant at an early date, F. H. Caldwell, president of the concern announced recently. The new plant, which will be operated as the Mutual Enamel Ware Co., will cost approximately $250,000. Application for a charter has already been filed. The plant will be located in Chattanooga.

The new concern will manufacture practically the same line of goods as the Cahill Iron Works including bath tubs, sinks and other enameled wares. According to Mr. Caldwell, the new concern will start with a capacity of 250 tubs a day. Ultimately all tubs and the company's line of large Tennessee, Chattanooga and Pacific sinks, slop sinks and all heavy ware will be made in the new shop and lavatories, closet tanks, and other small wares will be made in the present plant.

The company announces that there will be no bonds or stock offered to the public for sale.

* * *

PURCHASE of a site, 300 x 300 feet, has been made by the Universal Motor Co., Oshkosh, Wis., on which it plans to build a plant. The first building will be an administration building, 40 x 150 feet, and a machine shop unit, 150 x 250 feet. The latter will be of saw-tooth type of construction. The company at this time does not know just what its equipment requirements are but will determine these within the next 60 days. It is expected the total outlay will approximate $250,000.

* * *

SINCE it has outgrown its present quarters, the General Machine & Tool Co., Jackson, Mich., has completed plans for the erection of a modern building upon land recently purchased. The new plant will be 90 x 150 feet on Wildwood avenue along the mainline of the Michigan Central railroad. It will be of daylight construction, brick, steel and glass. The company is engaged in the machining and heat treating of automobile, truck and tractor parts, the major portion of its output going to the Ford Motor Co., about 250 front axle assemblies being made daily. The capital stock has been increased to $100,000 through the sale of 2800 shares of preferred stock. The corporation, composed almost entirely of Jackson men, was incorporated in June, 1917, and its growth has been steady ever since.

* * *

ORGANIZATION of the Hydraulic Machinery Mfg. Co., Port Neches, Tex., is being effected by C. F. Holmes, president, A. H. Dewer, secretary, and R. C. Cogburn, treasurer. This company recently was incorporated with a capital of $250,000, and will engage in the manufacture of portable turbine motors and other power equipment. It plans to erect a plant to consist of a foundry, machine shop and plate shop, but actual construction will not be started for some time.

* * *

THE McKneat Mfg. Co., a corporation organized under the laws of Pennsylvania, has leased a factory building at Easton, Pa., for the purpose of manufacturing a line of oil burners and equipment. This line is manufactured under the company's own patent and quite a number of installations already have been made in plants throughout the country. The officers of the company are: President, C. P. Astrom; vice president, E. R. Euston; secretary, W. I. Gassert; treasurer, A. J. McVay; chairman, board of directors, A. A. Neave.

* * *

SPECIAL equipment for piston ring work alone will be required by the Detroit Ring Casting Co., Plymouth, Mich., recently incorporated with a capital of $125,000. Its plant was purchased from the National Foundry & Machine Co., Plymouth, and its officers are the same as those for the Detroit Piston Ring Co., 49-57 Richmond avenue, Detroit, namely; John Magee, president; J. Martin, vice president; and Harry Magee, secretary-treasurer. The main office of the Detroit Ring Casting Co., is 7401 Richmond avenue, Detroit.

* * *

THE Unit Stove & Furnace Co., Belleville, Ill., soon will be ready to start operation of its plant at No. Birmingham, Ala., where stoves, ranges, heaters and hot air furnaces will be produced. Edward Leopold, Belleville, is president of the company; William H. Tophorn, vice president and superintendent; Elmer E. Leopold, secretary-treasurer, and George Marsh, assistant superintendent. The company purchased the old plant and site of the Birmingham Car Mfg. Co. and has transformed it to a stove foundry.

* * *

THE capitalization of the Globe Seamless Steel Tubes Co., 425 East Water street, Milwaukee, has been increased from $600,000 to $1,000,000. The increase reflects the growth of the business, which was facilitated during the past year by the erection of several large shop extensions. Some further additions are to be built later, when construction conditions become more stabilized. Lawrence Fitch is president and treasurer, having succeeded the late E. B. Renshaw of Evanston, Ill., as president two months ago.

* * *

HERETOFORE owned and operated by the Grand Rapids Foundry Co., Grand Rapids, Mich., a foundry has been purchased by the Oliver Machinery Co., that city. It will be operated under its old name, although it is being redesigned for the Oliver company by the H. M. Lane Co., Detroit, engineer. A 10-ton crane already has been purchased and the only tools that will be needed will be an additional air compressor and several molding machines, electrical and transmission apparatus needs all being filled. R. F. Baldwin is treasurer.

* * *

LOCATED at present in temporary quarters at 819 Hamilton street, the Utica Compressor Co., Inc., Utica, N. Y., will build a plant as soon as conditions warrant such action. It specializes in the production of small air compressors for garage service and for use on trucks and pleasure automobiles. Practically all machinery needed at present has been purchased. Capital stock is $30,000 and officers are: F. E. Beck, president; H. B. Hemstrought, vice president; C. A. Schmidt, treasurer and O. J. McKeown, secretary.

Works Extensions

Of Minnesota Steel Co. Progressing—Mesabi Iron Co. Places Contracts

(Special Correspondence.)

Duluth, May 29.—Good progress is being made on the extensions of the Minnesota Steel Co.'s plant in Duluth. The concrete foundations for three of the buildings were laid during the winter months, and a start has been made on the superstructures. It is expected that the buildings will be ready for the installation of machinery by next fall and that the mills will go into operation by the spring of 1921, in accordance with the original schedule. Approximately 3200 men are now employed in the various departments of the present plant and on new construction.

The blast and open-hearth furnaces now are operating practically at capacity, as compared with 35 per cent last fall. Shipments are being handicapped through the car shortage, but it is believed that railroad transportation conditions are better in the Northwest than in other parts of the country.

A report has been current in steel trade circles here to the effect that the Harding tract of over 1300 acres on the Wisconsin side of the St. Louis river, and directly opposite the Minnesota Steel Co.'s plant, has been sold, and that an announcement regarding the identity of the purchasers and their intentions may be expected in the near future. Whether the property has passed to the control of the Steel corporation has not been ascertained. It is known, however, that surveyors of the Duluth, Missabe & Northern railroad have been going over the tract recently. It was assumed that the Steel corporation was interested. The Harding tract is the largest individual tract of vacant property in the steel plant district.

Labor conditions on the Mesabi and Vermilion ranges are satisfactory so far this season and no trouble is expected. Austrian labor on the ranges, particularly in the Hibbing district is being supplanted to some extent by Greeks this spring. During the first two weeks of the season, common laborers have arrived in crowds of around 50 a day.

Operations are being held to a minimum on the Cuyuna range this season with only a few properties working. The Croft mine is making substantial shipments of iron ore to the docks, and the Winston-Dear Co. is stripping and making shipments of manganiferous ore from the Sagamore mine. Both are John A. Savage & Co. properties. The American Manganese Mfg. Co. is shipping from the Cuyuna-Duluth mine and the Merritt Development Co. is preparing to start work on its properties. The stockpile of the Sultana mine on the Cuyuna range has been sold by the sheriff to the fee-holders at $51,000. The sale was made to settle taxes and royalty claims against the company. Operators of manganiferous ore properties are experiencing a slack period as a result of a light demand for such ores.

From present indications the most strenuous efforts will be necessary if the imposition of a tonnage tax is to be averted at the next session of the Minnesota state legislature. Not to be behind the Non-Partisan league, the delegates at the recent Republican convention held at St. Paul, voted in favor of inserting a tonnage tax plank in the party's platform, and while the Democratic leaders have made no announcement as yet, it is believed that they may do likewise.

The Mesabi Iron Co. which will treat low grade ores from the eastern Mesabi recently let a contract to the Minneapolis Steel & Machinery Co. for the building of a mill. This will have a capacity for treating up to 5000 tons of ore daily. Contracts have been placed for practically all the machinery to be required for the plant.

Grading has been begun for the first 200 houses to be erected by the Inland Steel Co., East Chicago, Ind., for its employes. The company plans to rent these houses, but expects to furnish money to employes so that they may erect houses on plans of their own choice.

Obituaries

DWIGHT HUKIL COBLE, secretary of the H. C. Frick Coke Co., whose death at his home in Pittsburgh, May 23, after a brief illness was noted in the May 27 issue of THE IRON TRADE REVIEW, was born in Steubenville, O., July 20, 1874, and had been associated with the United States Steel Corp. since 1896. From 1900 to 1902 he was private secretary to the late James Gayley, then vice president of the corporation. He had been identified with the H. C. Frick Coke Co. since 1902. He was a graduate of the Lawrenceville Preparatory school, Lawrenceville, N. J., and entered Princeton university with the class of 1898 but left before graduating.

Death of his only son, Dwight S. Coble, on May 15 was a great shock to Mr. Coble and is believed to have contributed considerably to his failure to withstand an attack of pneumonia.

Samuel Ferguson, president of the Detroit Lead Pipe Works, Detroit, and a resident of Detroit and vicinity for 72 years, died recently, aged 85. Mr. Ferguson was born in Scotland and came to Detroit when 13 years old.

John P. Harrington, one of the organizers of the Erie Forge Co., Erie, Pa., and who previously had been superintendent of the Erie Car Works, of the same city, died suddenly at his home in Erie, Pa., May 26. Mr. Harrington, who was 76 years old, was born in Ireland, but came to the United States when a boy, locating first in Louisville, Ky., and subsequently in Erie.

August A. Vilsack, chairman of the board of directors of the Washington Tin Plate Co., Washington, Pa., died at his home in Pittsburgh, May 27, following an illness of several months. He was born in Pittsburgh, Feb. 11, 1876 and received his education in the schools of Pittsburgh, Canisius college, Buffalo and Mt. St. Mary's college, Emmitsburg, Md., being graduated from the latter institution in 1896. In early manhood, he was connected with the Pennsylvania national bank and later with the German national bank of Pittsburgh.

Edward Double, president of the Union Tool Co., with plants at Torrance, Cal., West Chicago, Ill., and Carnegie, Pa., died at the West Penn hospital, Pittsburgh, May 27, following an operation for appendicitis. He was born in Titusville, Pa., 46 years ago, but went to California when a boy and later engaged in the manufacture of oil well machinery and equipment. He was the founder of the company of which he was head at time of his death. He had been in Pittsburgh during the past few months superintending changes at the plant of the Alloy Steel Forge Co., Carnegie, Pa., which was taken over early in the year by the Union Tool Co.

Expect Deflation To Be Orderly

Favorable Aspect of Situation Lies in Realization of Bankers and Business Men That a Readjustment Is Required—Reserve Board to Invoke All Powers to Compel Loan Cut—Other Financial News

BY JOHN W. HILL, FINANCIAL EDITOR

THE feeling rapidly is gaining ground that the period of deflation and readjustment, which is now conceded to be under way, will be carried out in an orderly manner and with a minimum of inconvenience to essential industry or to conservatively-managed, well-financed and solvent concerns. The most favorable feature of the present situation lies in the fact that virtually all banks and a growing number of business men have come to realize the necessity of more conservatism in extending loans and of a reasonable reduction in the volume of outstanding credits.

The attitude of sound-thinking business men was indicated by the decision of the National Association of Manufacturers at their meeting in New York recently, to put price reduction of from 15 to 25 per cent into effect by autumn. Most industrial leaders know that the feverish prosperity of the last 18 months contained much that was artificial and unstable and that once the readjustment from the recent hothouse conditions is accomplished all indications point to a period of real and substantial prosperity.

Warn of Drastic Deflation

Some misapprehensions have gone out as a result of the recent meeting of the federal reserve system authorities in Washington. One of these is that resolutions were adopted demanding a 10 per cent reduction in the present aggregate of bank loans in the country which are approximately $20,000,000,000. The facts are that the memorial sanctioned at the conference merely stated that if bank loans were reduced by 10 per cent, or some $2,000,000,000 in the next four months, the nation would be in a much better shape to meet the credit expansion that will be necessary this fall in moving the crops. The reserve board has warned against too drastic deflation and no arbitrary cutting of all loans 10 per cent is to be expected; although gradual pressure will be brought to bear by the banks to get certain borrowers to liquidate 10 per cent or more. Other customers whose business is of a less speculative and more essential nature even may require further legitimate expansion of their loans instead of curtailment, it is explained. All borrowers however will be compelled to keep larger margins of deposit at the banks henceforth, bankers say, and money even for most legitimate purposes is expected to continue exceedingly tight for some months.

The other misapprehension concerned the reserve board's policy on essential and nonessential loans. The board, contrary to widespread impression, has not attempted to draw a dividing line between these two classes of industry. The matter of discrimination is put up to the individual banks which are expected to know which are the real sustaining industries in their respective communities and to shape their loan policies accordingly. The reserve board, however, reserves the right under the law to refuse to accept any paper presented for rediscount and in this way it may keep a close check on member banks' activities. While the board has not made any official announcement on the subject, it is known that the excessive consumption of capital, labor, and materials by the pleasure car industry is frowned upon. Two federal reserve banks, the Kansas City bank and the Atlanta bank, officially have announced discrimination against automobile paper, but other districts have not expressed themselves so definitely.

Figures showing the April record of foreign trade throw some light upon the recent strength of the European exchanges, and the apparently better sentiment prevailing regarding conditions across the Atlantic. Also those figures disclose one of the most powerful of the various converging factors, which are causing prices to fall in this country. April exports to Europe were $365,000,000 against $500,000,000 in April, 1919, a falling off of 26 per cent, in the face of an increase in prices in this country of 26 per cent in one year. On the other hand imports from Europe have increased to $111,000,000 from the $42,500,000 of April, one year ago, a gain of 164 per cent, in the face of import's valuation based on exchanges that are vastly depreciated as compared with one year ago. While the excess of exports to Europe still is running at the rate of $254,000,000 monthly, the shrinkage since April, one year ago has been nearly 50 per cent. Other parts of the world also are increasing their imports to this country. The excess of imports from Asia has increased from $11,000,000 in April, 1919, to $35,000,000 in 1920, while excess of imports from South America jumped from $7,000,000 one year ago to $29,000,000 in April this year. With imports from all parts of the world growing so rapidly, the swinging of the pendulum of America's foreign trade from an excess of exports to an excess of imports is plainly to be seen. If and when imports again will overtake exports depends entirely upon the rate of Europe's recovery and her ability to export.

Westinghouse Unfilled Orders Grow

The last six months has seen a gradual increasing demand for the product of the Westinghouse Electric & Mfg. Co., and, according to the annual report for the year ended March 31, unfilled orders as of April 1, 1920, were valued at $71,156,732. Although the report shows that gross sales for 1920 of $136,052,092 were $24,000,000 less than last year the smaller cost of sales, including items of depreciation, taxes and manufacturing expenses, was responsible for a net manufacturing profit of $15,079,830 as compared with $15,712,514 in 1919. The manufacturing profit in 1918 was $15,509,470, although gross sales were only $95,735,407.

The company's gross business income from all sources was $16,801,164, as compared with $17,335,803 the previous year. Interest charges for 1920 were substantially reduced, however. Net manufacturing profit of $15,079,830 is less than $700,000 under the 1919 level. Gross business of $130,052,192, compared with $160,379,943, is the second largest ever reported by the company.

The balance sheet shows current assets of $101,896,951 and current liabilities of $31,002,540. Working capital of $70,894,411 shows a high percentage as related to gross business. The surplus of the company at the end of March was $43,435,763. In 1919 the working capital of the company was $69,694,611. Inventories in the present report are placed at $63,018,123, as compared with

$59,550,262 in the preceding year. The comparative income account follows:

	YEAR ENDED MARCH 31		
	1920	1919	1918
Gross earnings sales billed	$136,052,092	$160,379,943	$95,735,407
Cost of sales	120,972,262	144,667,402	80,225,937
Net mfg. prof.	$ 15,079,830	$ 15,712,541	$15,509,470
Other income.	1,721,334	1,623,262	1,325,263
Gross income from all sources	$ 16,801,164	$ 17,335,803	$16,834,733
Int. charges.	1,594,823	2,276,795	1,429.052
Net income avail. for div. and other purp.	$ 15,206,341	$ 15,059,008	$15,405,681

In his remarks to stockholders Guy E. Tripp, chairman of the board, says in part:

"The surplus as of March 31, 1920, is $43,435,763.55, being an increase of $7,488,031.25 over the surplus at the beginning of the year.

"The property and plant account, representing real estate, buildings, equipment, etc., shows a reduction as compared with the previous year, due in part to the sale of certain plants which were engaged mainly in the manufacture of munitions.

"The development and extensions of the business of the company, together with the increased costs of operation due to higher wages and higher prices for raw materials, have required a large amount of additional capital. These requirements were met in part by the sale of investments in other companies, principally foreign holdings, and in part from surplus earnings retained in the business.

"The current demand for the products of the company is in excess of its present plant capacity and a continuation of this demand will make necessary further additional facilities and still larger working capital."

Subsidiary of Canadian Firm Authorized

The Dominion Engineering Works, Ltd., Montreal, Can., a subsidiary of the Dominion Bridge Co., Ltd., has been authorized at a meeting of shareholders of the latter concern. The new organization will take over the Dominion Engineering & Machinery Co., Ltd., where the new Laurentide paper machines are being made. It will continue the manufacture of paper making machinery. In addition it will manufacture hydraulic machinery and engage in general heavy foundry and machine shop work. The directors include George Chahoon Jr., president of the Laurentide Co.; Sir Herbert Holt, president of the Montreal Light, Heat & Power Co.; Julian C. Smith, general manager and chief engineer of the Shawinigan Water & Power Co.; Howard Murray, vice president of Alfred & Co.; and H. B. Taylor, vice president William Cramp & Sons Ship & Engine Building Co.

Fairbanks, Morse & Co. Earnings Grow

The quarterly report of Fairbanks, Morse & Co., Chicago, shows net earnings available for the common stock of $1,044,593 an increase of 52 per cent over earnings of the corresponding quarter of the previous year. Net shipments during the quarter reached $7,597,379 an increase of 37 per cent over the net sales of the first three months of 1919. The deduction for depreciation taxes and other charges was $408,105 in comparison with $280,674 the previous year. Surplus amounted to $656,848 as against $615,039 in 1919.

Form Machinery Company

Organized with a capital of $100,000, the Hess-Schenck Co., Cleveland, has taken over the lease on the warehouse and display floor, formerly occupied by the D. M. Osborne Machinery Co., at 221 St. Clair avenue N. E., Cleveland. C. N. Hess, who has been affiliated with the W. M. Pattison Supply Co., that city for about 23 years, latterly as manager of its machinery department, and C. F. Schenck, who at one time was vice president of the Biggs-Watterson Co., Cleveland, but who resigned to go into business for himself, selling machinery, cranes, etc., from his office in the Engineers' building, that city, are associated in the enterprise. Both new and second hand machinery will be sold and the company plans to carry a large stock of representative machine tools and is arranging for several exclusive lines. It was erroneously reported last week that the Osborne store had been purchased by the Pattison Supply Co., to be used for a used machinery salesroom.

Opens Machinery Store

Formed the first week in January, the Bauschke Machinery Co. Cleveland, which hitherto has occupied office space only at 517 Garfield building, has opened up a warehouse and display room at 1034 St. Clair avenue N. E. It is headed by C. C. Bauschke, who for a number of years was Ohio representative for the Kearney & Trecker Co., Milwaukee, manufacturer of milling machines. Associated with Mr. Bauschke are E. W. Kenyon, formerly Ohio representative for the W. F. Davis Machine Tool Co., and C. B. Harding, formerly eastern representative for the Lees-Bradner Co., Cleveland. Incorporation papers now are in process of preparation and an election of officers will follow shortly. Complete lines of both new and used machinery will be handled and arrangements already have been made for several exclusive lines.

Earnings at Record

First quarter earnings of the Studebaker Corp. were $5,272,092, exceeding by 15 per cent the corporation's best previous quarter earnings, according to the statement of President A. R. Erskine. This compares with earnings $1,145,709 for the corresponding quarter of 1919 before the deduction of tax reserves. For the initial quarter of 1920 sales aggregated $23,301,242 compared with $10,890,348 in the same period last year. The surplus was $4,472,092 after allowing $800,000 for federal taxes.

Financial Crop Ends

IN A statement of earnings filed with the Pittsburgh stock exchange with an application for the listing of 60,000 additional common shares and 4800 additional preferred shares, the Standard Sanitary Mfg. Co. reports undivided profits for the year 1919 of $1,158,709 and a surplus at the close of that year of $7,646,120. The company now has authorized and outstanding $12,000,000 in common stock and $8,000,000 preferred stock authorized, of which $4,400,000 is outstanding.

* * *

The Cincinnati Tool Co., Norwood, O., has increased its capital from $20,000 to $100,000.

* * *

Total manufacturing profits of the Chicago Pneumatic Tool Co., for the quarter ended March 31 amounted to $1,365,900 according to the company's report. After all expenses and charges net profits available for dividends were $253,304 at the annual rate of $1,013,216. In 1919 the net was $489,051. A dividend of 22 per cent on the capital stock outstanding was declared on March 25, payable April 25.

* * *

A schedule of distribution of approximately $4,500,000 to holders of prior judgments and claims upon the J. V. Thompson estate recently was filed with Referee in Bankruptcy William R. Blair, in Pittsburgh, for approval and the elimination of overlapping claims. This amount covers all but slightly more than $1,000,000 of the equity in the estate recently paid to West Virginia creditors under a compromise schedule and agreement which permitted the sale of the entire Thompson estate to the Piedmont Coal Co.

May Machinery Sales Restricted

Transportation Tieup, Restricted Credits, Uncertainty Regarding Industrial Outlook and Labor Difficulties Serve as Deterrents to Equipment Demand—Railroad Needs, Both Issued and Pending Are Large—Crane Business Fair

CLOSELY interwoven with the machinery market of the past month has been the transportation situation. Practically the only sizable demands during May were made by the railroads and at the same time, railroad embargoes, due to the freight tieup, superinduced by the strike and other causes, have been the chief contributing cause to the restriction of sales of machine tools, cranes and other equipment, as well as the curtailment of active inquiries. Latterly this affected the inquiries from railroads as well, several of which are held up. Dealers have been faced with the peculiar situation of having more unfilled orders on their books than at any time during the past three or four years and have been unable to reduce the backlog because of the muddled condition of the railroads. Manufacturers have been unable to ship out crated stocks and in some cases the storage of these has militated against additional manufacture, while in other instances more machines could not be built because of inability to secure adequate stocks of raw materials. All sorts of expedients have been resorted to in an effort to make deliveries. While motor trucks have been in great demand by other industries, some have been available for machine tool delivery, particularly for short hauls, like from Cleveland and Cincinnati to Pittsburgh. Great Lakes ships have made deliveries of equipment in Detroit and western cities.

Other deterrents operating upon the equipment business have been labor troubles, the uncertainty regarding the business outlook, the restriction of credits, the postponement of construction projects, etc. Notwithstanding all this, however, prices continue strong and several advances were noted in May.

May Featured by Large Railroad Inquiries

RAILROAD business, prospective, pending and actual, has been the feature of the past month's equipment trading. One of the largest lists was issued by the Norfolk & Western railroad, calling for about 80 tools, while the Chesapeake & Ohio asked for prices on about 40. The Southern Pacific concluded purchases, aggregating $200,000, while the Texas & Pacific bought about $50,000 worth of shop equipment. The Lehigh Valley brought its total purchases to about $100,000 and the Baltimore & Ohio bought a number of plate working machines. The Hocking Valley and Nickel Plate continued to receive proposals, while the Rock Island and Santa Fe issued small lists in Chicago. The Great Northern and Nickel Plate roads made some purchases on their lists issued in April, while some expected lists did not materialize. These included chiefly, the New York Central, Erie, Delaware & Lackawanna, Boston & Maine, Delaware & Hudson and a few others. The Erie is expected to expend about $600,000 for equipment for new shops at Susquehanna, N. Y. The New York, Ontario & Western asked for prices on several tools, while the list of the St. Louis & San Francisco railroad called for about 20 items, some of which were purchased.

Automotive Industry Slows Up Its Equipment Demands

AUTOMOBILE parts companies were exceeded only by tractor manufacturers in the May demands of the automotive industry. Henry Ford & Son, Dearborn Mich., were reported as purchasing 40 drilling machines. The Cleveland Tractor Co., Cleveland, bought multiple spindle drills, and the Samson Tractor Works, Janesville, Wis., revived its inquiry and made several purchases. The Willys-Overland Co., Toledo, O., entered the market for planers, shapers, etc., while the Grant Motor Car Co., Cleveland, bought some small machines for the plant of the H. J. Walker Co.

As indicated, inquiries from parts companies, however, were fairly large. The Eaton Axle Co., Torbensen Axle Co., and the Parish & Bingham Co., Cleveland, all made purchases and those by the first mentioned were considered heavy. The Timken-Detroit Axle Co. bought miscellaneous equipment for Canton. The Stevens Gear Co., Indianapolis, entered the market for 60 gear-cutting units, while the Standard Spring & Axle Co., Dallas, Tex., issued a list of 12 items. The Air Friction Carburetor Co., Dayton, O., put out a fairly large inquiry as did the International Steel Products Co., Hartford, Wis., the latter asking for presses for automobile tanks.

Miscellaneous Demand More or Less Sporadic

WHILE a decided falling off in the demand was noted in the month, due to various causes, the miscellaneous manufacturing lines were fairly well represented. The General Electric Co. continues to issue inquiries from time to time for its various plants and the past month's trading included a large list for its Bridgeport, Conn., plant. The United Engineering Co., Canton, O., asked for 12 lathes, while the National Acme Co., Cleveland, was reported to have purchased 20. The Amoskeag Mfg. Co., Boston, issued a list of about 18 tools, while smaller lists were sent out by the Royal Metalware Mfg. Co., Lexington, N. C., the Faultless Caster Co., Evansville, Ind., the Ledhercamp Mfg. Co., New Albany, Ind., and the Safety Nut & Bolt Co., and Upson Nut Co., Cleveland.

Crane Demand Continues for Small Lots

SALES of cranes likewise were restricted during May since builders and sellers alike were affected by the railroad situation, and numerous inquiries were withheld because of the drawing in of the lines on new construction. Most inquiries and purchases were of one or two cranes each. The Brooklyn Rapid Transit Co., Brooklyn, N. Y., asked for prices on four and bought one or two. The Atlas Crucible Steel Co., Dunkirk, N. Y., awarded five while the Cambria Steel Co., Johnstown, Pa., bought six. The Hedden Iron Construction Co., Elizabeth, N. J., closed on six monorail hoists, while 10 small hoists were sold to the Charlestown, W. Va., naval ordnance plant. The Pacific Fruit Express Co., San Francisco, bought 12 small cranes for its different plants, while eight cranes were placed through the Roberts Engineering Co., Philadelphia, for a steel plant in Spain. The Tientsin-Pukow railroad, China, closed on five overhead electric cranes, while a southern manufacturer bought five electric cranes from the Shepard Electric Crane & Hoist Co., the Solvay Process Co., Syracuse, and the Mark Mfg. Co., Chicago, each bought three. The National Supply Co., Toledo, O., has issued an inquiry for cranes and coal-handling equipment, through its engineers.

Machine Tool Trading Inactive

Atlantic Coast Line Inquiry for 150 Tools Is Largest of Week—Much Railroad Business Pending—Buyers Disinclined to Close—Only Two Inquiries of Size Current in Cleveland—Crane Sales Lag

SLIGHT improvement in the transportation situation leaves the machine tool and equipment market practically unchanged from a week ago. Inquiries and orders for both machine tools and cranes are at a low ebb due to the disinclination to purchase by users who are uncertain regarding the business outlook or else are unable to finance projected expansion plans, because of restricted credits. Sales are confined to lots of one or two tools and an inquiry for five machines is considered large. The feature of the New York market, however, is a list of 150 tools, issued by the Atlantic Coast Line railroad, while in the West, the Chicago, Milwaukee & St. Paul railroad's list, calling for a dozen items, is the largest current inquiry. The lack of new business, however, is not so much a matter of concern as is the inability to make shipments. Dealers and manufacturers alike have many unfilled orders on their books and while customers apparently are anxious to co-operate in the present difficulty, many are calling anxiously for deliveries and one or two here and there are sending in cancellations on small lots only. Pittsburgh reports numerous sales of single machine tools and a lack of cancellations. Many of the steel companies, however, are holding up their expansion projects because of the tight money market. Two of the largest inquiries current in Cleveland come from the Faultless Caster Co., Evansville, Ind., and from R. T. Carle, Woonsocket, R. I.

Dullness likewise prevails in cranes, although the Shepard Electric Crane & Hoist Co. reports a few single sales and a contract for 20 hoists from the Standard Steel Car Co., uBtler, Pa. Sotter Bros., MacDougall-Potter Co., Johnson & Thompson and the Fort Pitt Malleable Iron Co. are among the crane purchasers. An award of four cranes, it is understood, is about to be closed for the Danville Iron & Steel Co., Danville, Pa., by the Kennedy, Van Saun Mfg. Co., New York. A sizable inquiry for handpower cranes is noted in the export market. Pittsburgh reports a marked decline in both orders and inquiries for cranes. Purchases by the Cambria Steel Co., on its announced $40,000,000 expansion program, are few as yet.

Atlantic Coast Line Inquiry Largest of Week

NEW YORK, May 29.—Inactivity again dominates the eastern machine tool market, both inquiry and buying being of slender proportions. Developments in the commodity markets are being watched closely in the light of their future significance and with shipments still exceedingly difficult, consumers appear willing to mark time, at least for the present. There is some improvement in the transportation situation, however, and this has made for optimism which was not in evidence a week ago among machine tool sellers. At the same time, the possibility of substantial buying by the railroads is serving as a tremendous stimulant to sentiment.

By far the largest machine tool inquiry of the week comes from the Atlantic Coast Line railroad, issued through its Wilmington, N. C., offices. This list calls for approximately 150 miscellaneous machine tools.

The dullness manifested in machine tools also is seen in the market for heavy equipment. Demand for cranes during the past week has been perhaps the lightest this year. Included in the few orders reported are a 25-ton electric crane with 55-foot span, and a 5-ton auxiliary, for Sotter Bros., Pottstown, Pa., business going to the Milwaukee Electric Crane & Mfg. Co., Milwaukee, and a 5-ton handpower crane, with 24-foot span, for the MacDougall-Potter Co., New York city, the award going to the Cleveland Crane & Engineering Co., Wickliffe, O. Early action on four cranes is expected by the Kennedy-Van Saun Mfg. Co., 120 Broadway, New York city. These cranes are for the Danville Iron & Steel Co., Danville, Pa. The Harris Structural Co., 148 Broadway, New York city, it is believed, also will close at an early date on a 15-ton electric crane with 75-foot span. A sizable inquiry for handpower cranes is noted in the export field.

Recent bookings by the Shepard Electric Crane & Hoist Co., Montour Falls, N. Y., include the following: One 5-ton crane with 60-foot span, Johnson & Thompson, Birmingham, Ala.; one 5-ton, with 32-foot span, Fort Pitt Malleable Iron Co., McKees Rocks, Pa.; 20 2-ton hoists, Standard Steel Car Co., Butler, Pa.; a 3-ton grab bucket hoist, United States Aluminum Co., Massena Springs, N. Y.

An item of interest to the trade is the purchase by Morey & Co., Broome and Lafayette streets, New York, of the equipment of the cartridge plant of the New York Air Brake Co., Watertown, N. Y., including a large number of presses. Many of these already have been sold to a well known manufacturer in England and it is understood that they are to be used in the manufacture of parts for Ford automobiles. Several likewise have been sold to a large Canadian steel company.

Total Sales Large in View of Hindrances

CHICAGO, May 28.—While considerable slackening of demand for machine tool equipment is noted by all dealers, the total of business remains surprisingly large in view of various difficulties met by producers, dealers and users of machine tool equipment. Transportation difficulties continue to prevent free shipment from manufacturers and from dealers' warehouses and is also a potent factor in discouraging users from buying further because of shortage of raw material on which to employ the machines. A ten-

Ludlum Steel Consistently Uniform

Mohawk Extra
High Speed Steel

Albany
Alloy Tool Steel

Huron
Alloy Die Steel

Yuma
Chrome Magnet Steel

Pompton
Carbon Tool Steel

Oneida
Oil Hardening Steel

Teton
Ball Bearing Steel

Seminole
"Foolproof" Chisel Steel

The extreme high quality attained in the manufacture of *"Ludlum" Steels* does not just "happen." It is the result of thoroughness and care throughout the entire process of manufacture.

The illustration above shows a small section of our large chipping room—just another precaution to assure users of *"Ludlum" Steels* the kind of material that most particular users of high speed steel are demanding.

What are your requirements?

Prompt shipments from warehouse stock at Watervliet, N. Y., Detroit, Mich., Chicago, Ill., or Cambridge, Mass., handled through our District Office.

Ludlum Steel Company

General Offices and Works:
WATERVLIET, N. Y.

Branches:
Chicago Cambridge, Mass. Detroit Buffalo New York City
Cincinnati Cleveland Philadelphia Pittsburgh

dency is noted for secondhand machinery to be offered more freely and at lower prices than formerly, owners apparently believing the time has come for prices to sag.

No inquiries for lots are being entertained with the exception of a few railroad lists, but manufacturers of automotive equipment continue to buy single tools steadily to round out their equipment. The Chicago, Milwaukee & St. Paul railroad has issued a list calling for about a dozen machines, and the Burlington railroad has closed for all the equipment asked on a moderate sized list put out some time ago. The first mentioned road's list comprises the following tools: One each 2½-inch double bolt cutter; 2½ x 26-inch turret lathe; 600-ton, 96-inch locomotive wheel press; 24-inch upright drill press; 1500-pound mill hammer; 60-inch radial drill press; 48-inch punch and shear; link grinding machine; 42-inch standard vertical boring and turning machine; pneumatic flue welding machine; flue welding furnace; locomotive hoist with six jacks, each 50 tons capacity.

At the recent government sale much equipment of value went at surprisingly low prices, while some other machines of practically no value except for scrap brought prices much above their market value.

The Gartland-McCarthy Foundry Co. will build a 1-story foundry in Chicago. The Illinois Car & Mfg. Co. will build a car repair plant at Hammond, Ind., and the Eclipse Automatic Mfg. Co. will build a machine shop at the same place. The Kokomo Brass Works, Kokomo, Ind., is building a machine shop and foundry. The Interstate Steel Mfg. Co., Milwaukee, will build a structural steel shop. The Superior Machine & Engineering Co., Detroit, will build a plant. The Fairmont Gas Engine & Motor Car Co., Fairmont, Minn., will build a foundry addition.

Machinery Sellers Having Comparatively Quiet Time

CLEVELAND, May 29.—With the transportation situation continuing practically the same as last week, the machine tool and equipment market here is exceedingly quiet. By some, a slight improvement is seen in the matter of getting shipments through but this is brought about mostly where carload shipments are made possible by the consolidation of small shipments going to the same general destination, to be reshipped by truck or otherwise upon arrival. Manufacturers still complain about being unable to obtain adequate stocks of raw materials but believe that the situation as regards labor has improved considerably. Some automobile and parts companies are reducing their schedules, which makes necessary the reduction of working forces at the same time and this is increasing the available labor supply. Prices remain strong, however, and nothing is indicated as yet in the way of a reduction on machnie tools. Expectation on the part of some users that lower prices will come is throught to be holding up considerable business.

Dealers' unfilled order books are overflowing and all claim they would be more comfortable if they could get all machines on order shipped. New orders and inquiries are not numerous but in view of all the hindering influences, a sizable business is being done in the way of sales of one or two tools to a customer. An inquiry for three or four tools today is considered large.

One of the largest inquiries to come before sellers, was issued by the Faultless Caster Co., Evansville, Ind., and calls for five presses: One each No. 73½ Bliss, No. 39 Bliss horning, old style preferred, No. 64 Consolidated, No. 3½ Toledo and No. 54 or 55 Toledo. Another large inquiry from a distance is that of R. G. Carle, 384 North Main street, Woonsocket, R. I., who is building a new plant for pulley production. He will buy nine punches, three lathes, forming machines, one drill press, emery wheels, etc. Three or four miscellaneous tols are wanted by the Miller Pasteurizing Machine Co., Canton, O., which is to erect to $100,000 plant. A few machines recently were purchased by the Woodruff & Edwards Co., Elgin, Ill., including a grinder. Representatives of the company recently visited dealers in Cleveland in an effort to pick up required machinery from warehouse and display room stocks. Those sellers who are able to maintain such stocks find it unnecessary to make strenuous efforts to dispose of them; many users are badly in need of them and instead of issuing an inquiry by mail, they visit sellers' stores and take the tools away immediately by truck in many cases, for fill-in and replacement purposes.

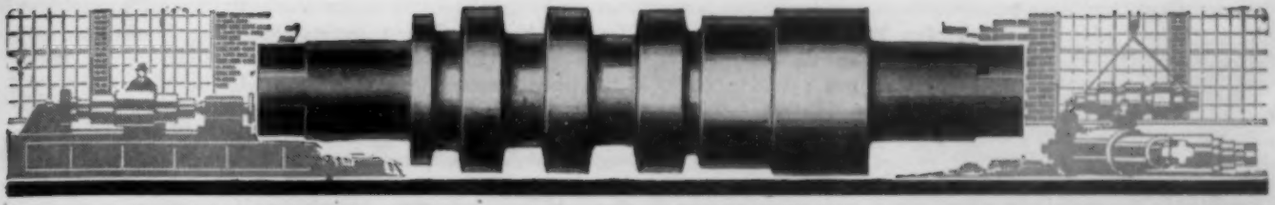
Small tools find a ready market and sales are frequent of one or two to a buyer. The Cleveland Abrasive Wheel Co., 2629 East Twenty-fifth street, Cleveland, wants a 30-inch short bed lathe. The Spencer Metal Products Co., Spencer, O., is understood to be in the market for some equipment, as is the Yarder Mfg. Co., Toledo, O. The Faultless Rubber Co., Ashland, O., wants a drill press and the National Pressed Steel Co., Cleveland, a planer. Proposals are going to the Fernwood Mfg. Co., Dayton, O., on a bench lathe and a 10-inch x 8-foot lathe, and to the Ohio Brass Mfg. Co., Mansfield, O., on miscellaneous equipment.

Items of interest to the trade are the opening of a store at 1034 St. Clair avenue, N. E., by the Bauschke Machinery Co., formerly operating from an office at 517 Garfield building, and the forming of a new company, the Hess-Schenck Co., by C. N. Hess, formerly of the W. M. Pattison Supply Co., and C. F. Schenck, who formerly maintained an office in the Engineers building and sold machinery, cranes, etc. The new company will locate at 221 St. Clair avenue, N. E., having taken over the lease held by the D. M. Osborne Machinery Co., at that address. D. M. Osborne, who has sold out his business plans to go west. Sellers of used machinery also are interested in the sale by the National Foundry Co., Erie, of one No. 2½ Climax wire straightener, Vulcan spruce cutter, with capacity to two inches and Hilles & Jones double end punch with dies which will shear to 1¼ x 5 inches. Forging equipment purchases are about to be made, it is thought, by the Irwin Augur Bit Co., Wilmington, O., which is erected a 60 x 120-foot forging shop; the Woodward Machine Co., Wooster, O., and the Wright Mfg. Co., Lisbon, O., which are to build additions to their forge shop.

Recent increases in capital stock of interest to the trade include: The Commercial Forgings Co., 3709 East Ninety-first street, Cleveland, from $20,000 to $110,000; the Clay Engine Mfg. Co., Cleveland, from $56,000 to $106,000; the Piston Ring Castings Co., Cleveland, from $25,000 to $100,000.

Railroad purchases continue to be made on a small scale, the Nickel Plate and Hocking Valley roads not having as yet wound up their requirements. Several other roads have withheld action in the way of putting out expected lists and one that is being watched very closely is the New York Central since this is expected to be large and cover the requirements of shops west of Buffalo. It is known that the requirements of the Ashtabula and Collinwood shops alone represent a sizable business but sellers doubt that action will be taken on them before the general situation of the railroads is greatly improved. The Baltimore & Ohio is planning a car repair shop at Sandusky, O.

Other prospective buyers of machine tools in the Cleveland and Detroit territories include: The Hays Mfg. Co., Erie, Pa., which is to build a 2-story plant 55 x 115 feet; the Fulton Tool Works, Huntington, W. Va., who will build and equip two 1-story additions; the Electric Vacuum



Rolling Mill Jim is Geared High on Reverse

Say Fellas'

Guess I'll have Hubbard cast me a lot of wire rods out of their electric furnace. I rolled a bloomin' mill roll out of the 10 inch mill the other day —cast some pig iron out of the plate mill—had a hell of a time stopping the R. R. floodin' us with empties—rest of the world is up side down, so might as well be that way myself.

Long So

Rolling Mill Jim.—

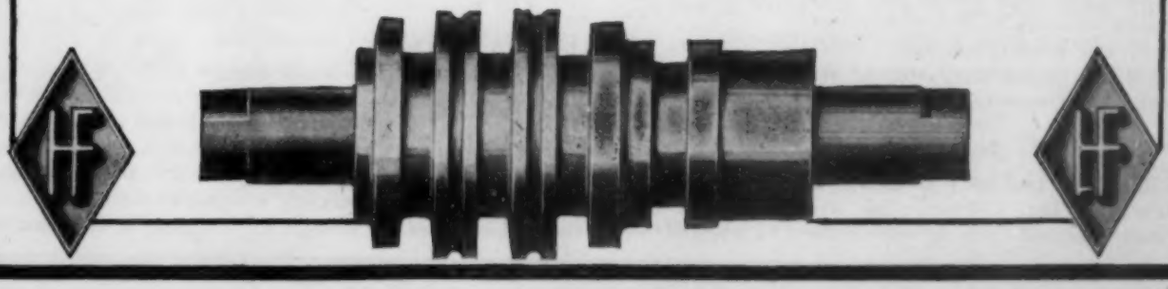
P. S. Rolled a pair of tongs out of the sheet mill last Friday.

P. P. S. Market bulge didn't hit me—sold my steel common 3-60 at the top.

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings



Cleaner Co., Cleveland which is to expend $50,000 for a 132 x 200-foot addition; the Virden Mfg. Co., that city, a 2-story addition 40 x 94 feet; the General Machine & Tool Co., Jackson, Mich., a 90 x 150-foot plant to make truck and tractor parts; the Superior Machine & Engineering Co., Detroit, a 2-story plant, 100 x 120 feet; the Fletcher Machine Co., 547 McDougall street, Detroit, a 1-story machine shop 30 x 96 feet and the Congress Tool & Die Co., Detroit, a 1-story machine shop 55 x 116 feet.

Buyers Adopt Attitude of Watchful Waiting

PITTSBURGH, June 1.—The waiting attitude of buyers of machinery and equipment which appeared soon after the outbreak of the railroad strike and which may be ascribed to the rather disturbed economic and financial situation created by that development, still is quite pronounced in this market. Whether it is cranes, machine tools or power equipment, it is still the general inclination of buyers to defer purchases.

A good many sales of machine tools are reported by dealers here, but they run entirely to single pieces and lists are conspicuous by their absence. Cancellations are unknown in this line, but this is because buyers knew what they wanted when they ordered and the need still exists. Easier railroad transportation conditions have tended toward improved deliveries. The report from all makers of cranes is of a marked decline both in the lettings and inquiries in the past few weeks.

A number of big steel company projects, involving the expenditure of millions of dollars are hanging fire, because the stringency in money and the uncertainty which recently has appeared as to the future course of steel prices and demands make for caution on the part of the officials in granting appropriations. Although the Midvale Steel & Ordnance Co. has plans for extensions and improvements at the plant of its subsidiary company, the Cambria Steel Co., Johnstown, Pa., involving more than $40,000,000, purchases for this project are few and far between, because the money is not available.

Canadian Dealers Have Several Months' Business Ahead

TORONTO, Ont., May 29.—Machinery and machine tool dealers in this district report a brisk demand for machinery and tools required by the smaller manufacturing concerns, and for replacement purposes by the larger buyers. Practically no big lists are out at present but many inquiries are being received for single machines. Dealers have sufficient orders on their books to keep them going for several months to come.

Announcements have been made during the past month or so of several new foundries which are now under construction or are about to be started and dealers are now looking for lists from this source, which should be numerous and large enough to remove any anxiety as to business over the remainder of the year.

Among the companies from which Canadian dealers look for considerable orders for machinery and tools are the Canadian Pacific railway, Montreal, which will make extensions to its Angus shops at a cost of $1,000,000, including the installation of a 50-ton mechanical coaling plant; the Georgian Bay Cement Works, Owen Sound, Ont., which proposes to spend $75,000 on new kilns and machinery; J. Evans, architect, 30 Water street north, Galt, Ont., who will receive bids until June 5 for the erection of a $25,000 machine shop for Elliott & Whitehall, Hobson street; George King, L'Ardoise, N. S., who will make alterations to lumber mill and install new machinery; the Northern Electric Co., 121 Shearer street, Montreal, which will build an addition; the Canada Iron Foundries, Ltd., Fort William, Ont., which will start work immediately on a foundry addition; the Toronto Iron Works, Cherry street, Toronto, which has let a contract for an addition.

The Davie Shipbuilding Corp., Levis, Que., has taken option on lands situated at Lauzon, Que., with the intention of building a large plant to prepare steel and iron for the construction of ships. The Moncrief Furnace Co., Guelph, Ont., T. E. Henry, president, will erect a modern foundry to be operated in connection with its present plant. The United Iron Works & Machine Co., Toronto, has secured a building in Milton, Ont., and will remodel it and install machinery for the manufacture of engines, etc. Fried Brothers, Glace Bay, N. S., are in the market for a second hand locomotive crane, capacity 15 to 20 tons, standard gage. A. L. Charlebois, Saskatoon, Sask., wants a 10-foot cornice brake. J. E. Thibaudeau, 72 Fourth street, Shawinigan Falls, Que., is asking for a second hand No. 3 or 4 Buckeye trench excavator. The Slingsby Mfg. Co., Brantford, Ont., is in the market for a Karch warping reel, 90 to 100 inches wide, with builder. D. C. Deacon, 47 Amelia street, Toronto, is in the market for two Baird flax cleaners and four Baird flax whippers.

Business Changes Recently Annouced by the Trade

EFFECTIVE June 1, the corporate name of the Macomber & Whyte Rope Co., Kenosha, Wis., has been changed to Macwhyte Co., without change in ownership, management or policy. It manufactures wire rope, streamline wire for airplanes, mine car hitchings, safety detaching hooks for coal mines. George S. Whyte is president and general manager, Jessel S. Whyte is secretary and E. W. Reitzel is treasurer.

* * *

The Western Heavy Hardware & Iron Co., Inc., Oakland, Cal., recently removed from 430-438 Ninth street to enlarged quarters at 261-269 Fourth street, at the corner of Alice street.

* * *

The Wayne Machinery Co., Fort Wayne, Ind., has established a branch store at 121 South Third street, Louisville, Ky., in charge of L. Kenner.

* * *

The G. & O. Pattern Works has removed to enlarged quarters at 752-754 South Pierce street, Milwaukee.

* * *

The Electric Controller & Mfg. Co., 2700 East Seventy-ninth street, Cleveland, has opened a branch office at room 370, 49 Federal street, Boston, in charge of M. D. Goodman.

* * *

A merger of the Johnson Iron Works and the New Orleans Dry Dock & Shipbuilding Co. has been effected under the name of the Johnson Iron Works, Dry Dock & Shipbuilding Co., Inc.

* * *

Westinghouse, Church, Kerr & Co., Inc., has removed its offices from 37 Wall street to 125 East Forty-sixth street, Grand Central Palace, New York. This business recently was merged with that of Dwight P. Robinson & Co., Inc.

Save time

by placing Rivet Heaters *close to the work*

How far do *your* rivets travel from heater to work? Why not save time and bother by placing heater near the job?

You can do it if you have a Berwick Electric Heater. Smaller sizes can be furnished on wheels. Chain hoists provided for larger sizes for moving about by crane.

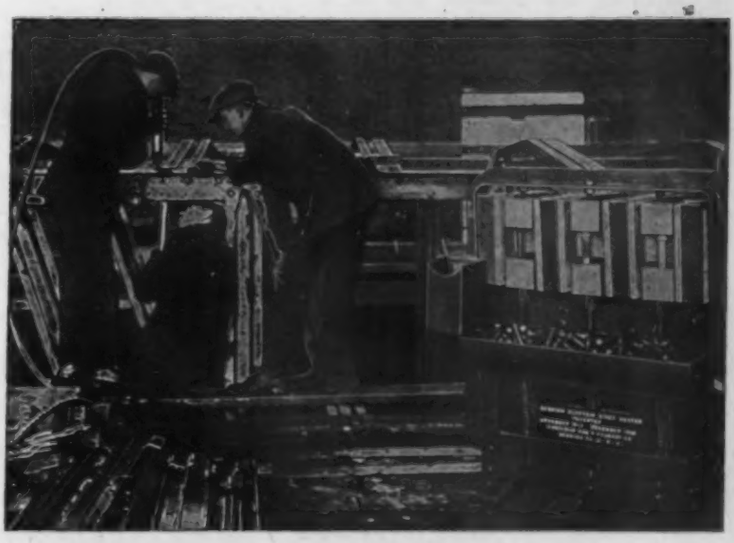
The Berwick often eliminates the sticker-boy entirely. No smoke or excessive heat to hamper the workmen. Prevents much throwing of hot rivets.

You can't disregard these advantages:

The Berwick Heater reduces burning and scaling to less than ½ of 1%. This saving alone averages 40 cents per hundred pounds of rivets.

Costs 20 to 70% less to run than fuel-burning heaters. Uses power only when hot rivets are needed. Less than 20 kilowatt-hours per hundred pounds of rivets heated.

Reduces fire risk; eliminates flames, smoke, gas, dirt and excessive heat.



No. 3 Two-electrode Heater with Hood. For ⅝" to 1" rivets, up to 4½" long or longer. Capacity about 300 hot rivets per hour.

BERWICK ELECTRIC RIVET HEATER

Provides hot rivets in 20 to 30 seconds after starting.

It is *safe* and easy to operate. No complicated wearing parts. Maintenance cost practically nil.

Berwick Heaters in daily use are *saving a dollar per hundred pounds* of rivets heated. Fifty Heaters were used six years, in our own shops, before any were offered for sale. Nine standard types and sizes are furnished. Capacities up to 600 hot rivets per hour, depending on size of rivets and type of Heater.

American Car and Foundry Company

165 Broadway, New York

Construction and Equipment

Concise and Timely Business Building Opportunities from the Field of Industry

Along Middle Atlantic Seaboard

BROOKLYN, N. Y.—The Self-Winding Clock Co. plans alternations to its plant at a cost of $100,000.

BROOKLYN, N. Y.—James W. Kaut, 39 Gold street, plans a machine shop, 18 x 100 feet, to cost $15,000.

BROOKLYN, N. Y.—The American Machine & Foundry Co. has started on a plant addition to cost $30,000.

BROOKLYN, N. Y.—The Universal Metal Spinning & Stamping Co. plans an addition at a cost of $10,000.

BROOKLYN, N. Y.—The Bushwick Sheet Metal Mfg. Co. has been incorporated with a capital of $15,000, by A. Simon, H. Stander and M. Rosner, 297 Stockton street.

BROOKLYN, N. Y.—Architects Jacob and August J. Gloster, 44 Court street, are preparing plans for a factory and boiler house, 4 stories, 50 x 100 feet. The name of the owner has been withheld.

BUFFALO.—The Newman Machinery Co., 607 Erie County Bank building, contemplates a new plant.

HORNELL, N. Y.—The Erie railroad will erect a large addition to its shops here.

LONG ISLAND CITY, N. Y.—The McDermott Body Corp. has acquired a site for a plant.

NEW YORK.—The Continental Can Co., 616 West Forty-third street, has plans for a 5-story plant at Jersey City, N. J., 200 x 200 feet, to cost $700,000.

NEW YORK.—The New York Model Boat & Mfg. Corp. recently was incorporated with a capital of $10,000, by R. W. Long, R. F. Thomas and T. W. Tannock, 41 Broad street.

NEW YORK—The Motco Furnace Co. has been incorporated with a capital of $100,000, by J. E. Egan, P. B. McCoy and E. E. Gilman, 140 Broadway.

ROCHESTER, N. Y.—The Cyclomotor Corp. plans a plant addition, 2 stories, 80 x 100 feeet, at a cost of $50,000.

SYRACUSE, N. Y.—The Syracuse Gear Co. recently was incorporated with a capital of $50,000, by J. C. Roth, E. A. Brennan and E. R. Deming.

UTICA, N. Y.—The Brunner Mfg. Co. is enlarging its plant for the manufacture of automobile pumps.

UTICA, N. Y.—The Willoughby Co., Dwyer avenue and Turner street, manufacturer of auto bodies, has had plans prepared for a 4-story plant addition, 75 x 150 feet, to cost $50,000.

YONKERS, N. Y.—The Eloc Process Co. has been incorporated with a capital of $35,000, by W. H. Cole, W. Belknap and P. Loff, 203 West Fortieth street, to manufacture metal products.

LEBANON, PA.—The Lebanon Steel Co. is having plans drawn for a pattern shop, 55 x 110 feet, to cost $30,000.

MILLERSBURG, PA.—The Millersburg Reamer & Tool Co. has been incorporated with a capital of $20,000, by Walter A. Shatto and others.

YORK, PA.—The Butler Elliptical Wrench Mfg. Co. recently was organized with a capital of $25,000, by Willis Abbott and others.

CAMDEN, N. J.—The Esterbrook Steel Pen Co. is receiving bids for an addition.

MORRISTOWN, N. J.—The Jersey Tool Specialty Co., Inc., 43 Western avenue, has been incorporated with a capital of $25,000 by I. Dorman, Morristown, and F. A. Holt, Arlington, N. J., to manufacture screw drivers and other tools.

NEWARK, N. J.—R. Heller Co., manufacturer of tools, etc., will erect a garage, 100 x 100 feet, at a cost of $100,000.

NEWARK, N. J.—The H. A. Inman Co., 40 East avenue, has awarded a contract for a foundry, to cost $10,000.

NEWARK, N. J.—Samuel Jones & Co., 57 McClellan street, will erect a 1-story boiler house, 35 x 45 feet, and a factory building, 30 x 80 feet, at a cost of $25,000.

PLAINFIELD, N. J.—The Wood Newspaper Machine Co., 688 South Second street, contemplates a 1-story plant addition, 40 x 108 feet, to cost about $21,000.

TRENTON, N. J.—The Sarco Co., 19 East State street, steam specialties, is having plans drawn for a 3-story addition to cost $20,000.

WILMINGTON, DEL.—The Speakman Co., 816 Tatnall street, manufacturer of steam specialties, has awarded a contract for a foundry, 30 x 100 feet, to cost $15,000.

BALTIMORE.—William T. Hudgins, 906 Greenmount avenue, plans a machine shop, one story, 30 x 100 feet.

New England States

SKOWHEGAN, ME.—The Central Maine Power Co. will erect a 1-story, 40 x 186-foot power house.

CAMBRIDGE, MASS.—The Howard Chemical Co. plans a factory and boiler house.

CHELSEA, MASS.—The W. J. Murdock Electric Co. plans a manufacturing building, 2 stories, 50 x 80 feet, to cost about $25,000.

LOWELL, MASS.—The Saco-Lowell Shops has let the contract for a 5-story, 80 x 147-foot storehouse to cost $125,000.

LYNN, MASS.—The Signal Mfg. Co. has been incorporated with a capital of $25,000, by Louis A. Barrett, Louis Zaiger, Dorchester, Mass., and Emil C. Karlson.

GREENFIELD, MASS.—The Frank O. Wells Co., Inc., has been incorporated to build machinery, by Frank O. Wells, J. T. Seller, David Miller, Walter H. McCarthy, West Springfield, Mass., and J. Howard Jones.

SHELBURNE FALLS, MASS.—The Lamson & Goodnow Mfg. Co. has let the contract for a forge shop building.

SOMERVILLE, MASS.—The Whitney, Bremner & Howe Co. has been incorporated to make tools, etc., with a capital of $45,000, by John A. Bremner, William E. Whitney and Williams S. Howe.

TURNER FALLS, MASS.—The Montague Machine Co. has purchased a site on which it plans a new plant.

WORCESTER, MASS.—The Worcester Foundry Co., Inc., contemplates an addition.

NEWINGTON, CONN.—The American Machinery & Equipment Co., Hartford, Conn., plans a plant here at a cost of $200,000.

SOUTH NORWALK, CONN.—The American Insulating Co. plans a 3-story plant addition.

WATERBURY, CONN.—The Connecticut Light & Power Co. will erect an addition to its power house at a cost of $10,000.

Central States Activity

BEAVER DAM, WIS.—The F. Rassmann Mfg. Co., agricultural tools, is increasing its foundry capacity.

CHIPPEWA FALLS, WIS.—A machine shop for building and repairing machinery has been opened my Michel & Price. The first building is 45 x 75 feet, 1 story.

COLUMBUS, WIS.—J. M. Freet, Winfred, Wis., has awarded a contract to Jones Bros., this city, for a machine shop, warehouse and garage, 75 x 125 feet.

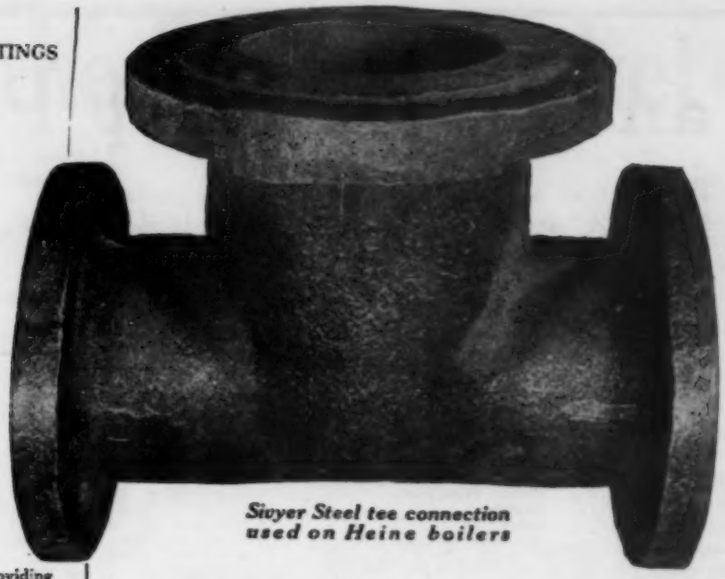
KOHLER, WIS.—The Kohler Co. plans a gray iron foundry addition, 105 x 300 feet.

MILWAUKEE.—The Richards Machine Co. will build a machine shop addition, 1 story, 32 x 46 feet.

MILWAUKEE.—The Ladish Drop Forge Co. has

(*Continued on Page* 1650)

SIVYER (S) CASTINGS



Sivyer Steel tee connection used on Heine boilers

The Sivyer Service of providing Electric Steel Castings has for its objects the decrease of machining costs and the increase of wearing-quality and life. Both are attained by methods which result from long experience and begin with the design of the casting itself When we find that a casting we are asked to furnish is of a design not consistent with good foundry practice, we study its function in the completed unit and offer the necessary suggestions to make it a really practicable casting job without affecting in any way its function and efficiency.

Secondly: Sivyer Service analyzes the functions of the casting and specifies the proper composition steel for the job; long experience with carbon and alloy steels has enabled us to reduce costs and increase quality remarkably for many different industries.

Thirdly: Sivyer Service makes a careful study of the pattern and molding problems involved, for improper gating and insufficient risers are often the greatest wasters of machining labor and metal.

Fourthly: Sivyer Service analyzes carefully the proper annealing methods to be used and controls their proper application through unfailingly efficient equipment and men. In short, the Sivyer Service supervises every step necessary to secure unusually and unfailingly good castings of electric steel. It never relies on one factor alone, relies very little even on the natural freedom of electric steel from occluded gases and on its commonly recognized merits in resisting crystallization. It also depends but little on the inherent scientific accuracy of the electric furnace process. From casting-design to sand-blasting and tumbling, the fundamental superiority of Sivyer Steel is due to its men and metal. Their value is best proved by the fact that, although the production of steel castings is generally looked upon as a local one, the Sivyer market is national.

STRAINS imposed by steam pressures ranging from 200 to 350 pounds per square inch, and the maintenance of high factors of safety, demand for high pressure boiler construction metal parts positively sound and certain in strength. All fittings must be made of a close-grained metal absolutely free from flaws. Because Sivyer Electric Steel best satisfies these requirements the Heine Safety Boiler Co. is using Sivyer Steel Castings for tee connections. Special gating, heading and pouring methods were devised by Sivyer to assure the perfection of these parts. The dense texture of Sivyer Electric Steel and the painstaking thoroughness of Sivyer methods — the specific ability to meet exacting conditions —these factors have aided in winning for Sivyer Castings their nation-wide market.

SIVYER STEEL

SIVYER STEEL CASTING COMPANY, MILWAUKEE

Iron and Steel Scrap Prices

CORRECTED TO TUESDAY NOON

GROSS TONS DELIVERED TO CONSUMER

Steel Works Scrap

HEAVY MELTING STEEL

Pittsburgh	$25.00 to 26.00
Chicago	22.00 to 22.50
Eastern Pennsylvania	22.50
Cleveland	23.75 to 24.00
St. Louis	22.50 to 23.00
Buffalo	24.50 to 25.00
New York (dealers)	18.50 to 19.00
Birmingham	20.00 to 21.00
Cincinnati	23.50 to 24.50
Valleys	25.00 to 25.25
Boston (dealers)	19.50 to 20.00
Detroit	20.50 to 21.00

BUNDLED SHEETS

Pittsburgh	$15.50 to 16.00
Eastern Pennsylvania	19.00 to 19.50
Cleveland	14.00 to 14.50
Buffalo	16.50 to 17.50
Cincinnati	16.50 to 17.50
St. Louis	13.00 to 13.50

STEEL RAILS, SHORT

Chicago	$26.50 to 27.00
Boston (dealers)	21.00 to 22.00
Cleveland	21.50 to 22.00
St. Louis	24.00 to 24.50
Birmingham	23.00 to 24.00
Cincinnati	23.00 to 24.00

STOVE PLATE

Pittsburgh	$30.00 to 31.00
Chicago	32.00 to 32.50
Eastern Pennsylvania	28.50 to 29.50
Cleveland	30.00 to 31.00
Detroit	30.50 to 31.00
St. Louis	30.00 to 35.50
Buffalo	31.50 to 32.50
New York	26.00 to 27.00
Birmingham	28.00 to 30.00
Cincinnati	28.00 to 28.50
Boston (consumers)	30.00 to 30.50

LOW PHOSPHORUS

Pittsburgh, billet and bloom crops.	$32.00
Chicago, billet and bloom crops	24.00 to 25.00
Eastern Penn. (guaranteed)	31.00 to 32.00
Buffalo	31.50 to 32.50

SHOVELING STEEL

Chicago	$21.50 to 22.00
St. Louis	21.50 to 22.00

KNUCKLES, COUPLERS AND SPRINGS

Pittsburgh	$26.50 to 27.00
Chicago	25.00 to 25.50
St. Louis	24.00 to 24.50

BALED SHEETS

Pittsburgh	$21.50 to 22.00
Chicago	17.00 to 17.50
Detroit	17.50 to 18.00

FROGS, SWITCHES, GUARDS

Chicago	$22.00 to 22.50
St. Louis	22.00 to 22.50
Eastern Pennsylvania	22.50

BOILER PLATE, CUT

St. Louis	16.00 to 16.50

ANGLE BARS—STEEL

Chicago	$25.00 to 25.50
St. Louis	22.00 to 22.50

Iron Mill Scrap

RAILROAD WROUGHT

Pittsburgh, No. 1	$32.00 to 33.00
Pittsburgh, No. 2	25.00 to 26.00
Chicago, No. 1	28.00 to 28.50
Chicago, No. 2	24.75 to 25.75
Eastern Pennsylvania No. 1	33.00 to 34.00
Cleveland, No. 1	28.00 to 28.50
St. Louis, No. 1	27.50 to 28.00
St. Louis, No. 2	25.00 to 25.50
Buffalo	30.50 to 31.50
Cincinnati	29.50 to 30.00
Birmingham, No. 1	23.00 to 25.00
New York, No. 1 (dealers)	29.00 to 30.00
Boston (dealers)	27.50 to 28.00

WROUGHT PIPE

Eastern Pennsylvania	$22.50 to 23.50
Buffalo	20.50 to 21.50
New York (dealers)	19.50 to 20.00
Boston (dealers)	19.00 to 20.00

YARD WROUGHT

Eastern Pennsylvania, No. 1	$28.00 to 29.00

CITY WROUGHT

New York, long (dealers)	$23.00 to 23.50

BUSHELING

Chicago, No. 1	$20.25 to 20.75
Chicago, No. 2	14.00 to 14.50
Cleveland, No. 1	18.75 to 19.25
Cleveland, No. 2	16.00 to 16.25
St. Louis, No. 1	19.50 to 20.00
Buffalo, No. 1	19.50 to 21.00
Cincinnati, No. 1	20.50 to 21.50
Eastern Pennsylvania, No. 1	19.00 to 20.00

MACHINE SHOP TURNINGS

Pittsburgh	$15.50 to 16.00
Chicago	11.50 to 12.00
Eastern Pennsylvania	18.00 to 19.00
Cleveland	12.00 to 12.50
Buffalo	16.00 to 16.50
New York (dealers)	16.00 to 16.50
St. Louis	12.50 to 13.00
Detroit	11.50 to 12.00
Cincinnati	14.00 to 14.50
Birmingham	13.00 to 15.00
Valleys	14.00 to 14.50
Boston (dealers)	14.00 to 15.00

CAST IRON BORINGS

Pittsburgh	$18.50 to 19.00
Chicago	12.00 to 12.50
Eastern Pennsylvania	20.00 to 21.00
Eastern Pennsylvania (chemical)	22.50 to 23.50
Cleveland	16.50 to 16.75
St. Louis	15.00 to 15.50
Detroit	14.50 to 15.00
Buffalo	16.50 to 17.50
New York (dealers' price)	17.00 to 17.50
Cincinnati	15.00 to 16.00
Birmingham	13.00 to 15.00
Valleys	18.25 to 18.50
Boston (dealers)	16.00 to 16.50

MIXED BORINGS AND TURNINGS
(For blast furnace use)

Eastern Pennsylvania	$17.50 to 18.50
Boston (dealers)	14.00 to 15.00
Cleveland	16.00

IRON AXLES

Pittsburgh	$44.00 to 45.00
New York (dealers)	46.00 to 47.00
Chicago	44.50 to 45.00
Eastern Pennsylvania	45.00 to 46.00
Detroit	41.00 to 42.00
Cleveland	42.50 to 43.00
St. Louis	43.00 to 43.50
Buffalo	39.00
Cincinnati	36.00 to 37.00
Birmingham	30.00 to 31.00

IRON RAILS

Chicago	$34.50 to 35.50
Cleveland	29.50 to 30.50
St. Louis	31.50 to 32.00
Buffalo	28.00 to 29.00
Cincinnati	26.00 to 27.00

PIPES AND FLUES

Chicago	17.00 to 17.50
Cleveland	19.00 to 19.50
St. Louis	17.00 to 17.50
Cincinnati	21.00 to 21.50

GRATE BARS

Chicago	$32.50 to 33.00
Cleveland	30.00 to 31.00
Detroit	22.50 to 23.50
Buffalo	23.50 to 24.50
New York	26.00 to 27.00
Eastern Pennsylvania	29.00 to 30.00

FORGE FLASHINGS

Cleveland, large	16.00 to 16.50
Chicago, small	17.50 to 18.00
Cleveland, small	17.00 to 17.25
Boston (dealers)	14.00 to 15.00

FORGE SCRAP

Chicago	$25.25 to 25.75
Eastern Pennsylvania, No. 1	19.00 to 19.50
Boston	14.00 to 15.00

ARCH BARS AND TRANSOMS

Chicago	$36.00 to 36.50
St. Louis	32.00 to 32.50

ANGLE BARS—IRON

Chicago	$35.00 to 35.50
St. Louis	29.00 to 29.50

Iron and Steel Works Scrap

AXLE TURNINGS

Pittsburgh	$22.00 to 23.00
Eastern Pennsylvania	21.00 to 22.00
Boston (dealers)	15.00 to 16.00
St. Louis	16.00 to 16.50
Detroit	$16.50 to 16.50
Cleeviand	18.00 to 18.50
Buffalo	19.50 to 20.50
Chicago	19.50 to 20.00

STEEL CAR AXLES

Pittsburgh	$34.00 to 35.00
Eastern Pennsylvania	40.00
Cleveland	33.00 to 34.00
St. Louis	35.00 to 35.50
Buffalo	39.00
Chicago	37.00 to 37.50
New York (dealers)	41.00 to 42.00
Birmingham	30.00 to 31.00
Boston (dealers)	36.00 to 36.50
Detroit	32.50 to 33.00

SHAFTING

Eastern Pennsylvania	34.00 to 35.00
St. Louis	32.00 to 32.50
New York (dealers)	29.00 to 30.00
Chicago	35.50 to 36.00

Iron Foundry Scrap

CAR WHEELS

Pittsburgh, iron	$40.00 to 41.00
Pittsburgh, steel	26.00 to 27.00
Chicago, iron	36.50 to 37.00
Eastern Pennsylvania, iron	38.00 to 39.00
Cleveland, iron	33.50 to 34.50
St. Louis, iron	35.50 to 36.00
Buffalo, iron	37.00 to 38.00
Birmingham, iron	30.00 to 31.00
Birmingham, tram car	31.00 to 32.00
Boston (consumers)	39.00 to 40.00
Cincinnati	30.00 to 31.00
New York, iron	37.00 to 38.00
Detroit	33.00 to 34.00

NO. 1 CAST SCRAP

Pittsburgh, vupola	$39.00 to 41.00
Chicago, cupola	42.50 to 43.00
Eastern Pennsylvania, cupola	37.00 to 39.00
Cleveland, cupola	39.00 to 40.00
New York, cupola (dealers)	37.00 to 38.00
Cincinnati, No. 1, machinery, cupola (net)	34.00 to 35.00
Detroit	31.50 to 32.50
Birmingham, cupola	30.00 to 35.00
St. Louis, railroad	37.00 to 37.50
St. Louis, agricultural	36.00 to 36.50
Buffalo	37.00 to 38.00
Boston (consumers)	42.00 to 43.00
Valleys	38.00 to 39.00

HEAVY CAST

New York (dealers)	$35.50 to 36.50
Buffalo	27.00 to 28.00
Pittsburgh	33.00 to 34.00
Cleveland	28.00 to 28.50
Boston (consumers)	34.00 to 35.00

MALLEABLE

Pittsburgh, railroad	$31.00 to 32.00
Pittsburgh, agricultural	27.00 to 28.00
Chicago, railroad	29.00 to 29.50
Chicago, agricultural	29.00 to 29.50
Eastern Pennsylvania, railroad	28.00 to 29.00
Cleveland railroad	31.50 to 32.00
Cleveland, agricultural	26.50 to 27.00
St. Louis, railroad	26.50 to 27.00
St. Louis, agricultural	25.00 to 25.50
Cincinnati, railroad	29.00
Cincinnati, agricultural	28.00 to 29.00
Boston, railroad	27.50 to 28.50
Buffalo	30.50 to 31.50

Miscellaneous Scrap

REROLLING RAILS
5 feet and over

Pittsburgh district	$32.00 to 33.00
Chicago	31.50 to 32.00
Eastern Pennsylvania	31.00 to 33.00
Cleveland	30.00 to 31.00
St. Louis	30.00 to 30.50
Birmingham	31.00 to 32.00
Boston (dealers)	29.00 to 30.00
Detroit	28.00 to 29.00

LOCOMOTIVE TIRES

Chicago	$27.00 to 27.50
St. Louis	23.00 to 23.50

BOILER PUNCHINGS

Chicago	27.00 to 27.50
Eastern Pennsylvania	29.00 to 30.00

When the Scrap Market Is Dull

While seeking a more favorable market the best form in which to hold your sheet scrap, etc., and the form that always commands the best prices is the dense hydraulically compressed bundle.

Thus less storage space is required—under roof to prevent loss from corrosion; and because of greater car tonnage under minimum car rate, you add from 25% to 50% freight savings to your profits.

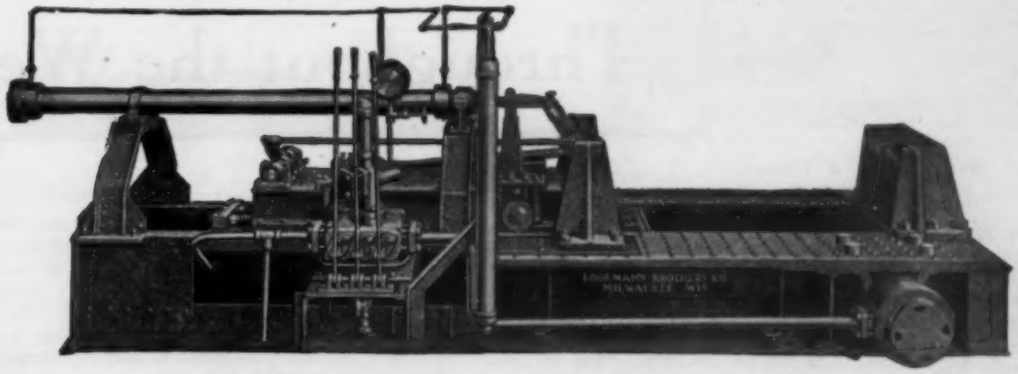
For greatest compression, largest daily output, at lowest operating cost, use

LOGEMANN Double Ram Hydraulic Scrap Metal PRESSES

You can enjoy the advantage of the accumulated experience from hundreds of Logemann scrap bundling presses now in use.

They embody a simplified mechanism that requires no special skill to operate rapidly. Press and pump are so designed that all the motive power applied is utilized, thus reducing power cost.

Powerfully built, all working parts constructed to resist the severest strains—selected material, first class workmanship—all minimize upkeep cost and insure lasting efficiency.



A medium sized press is shown; there are smaller and larger sizes in standard models.

Advise character and daily tonnage of your scrap and let us suggest press best suited to your requirements.

Logemann Brothers Co.

3126 Burleigh Street
Milwaukee, Wis.

Builders of Baling Presses and Hydraulic Machinery

(*Continued from Page* 1646)

increased its capital from $300,000 to $700,000 to finance the development of its plant and business.

MILWAUKEE.—The Globe Electric Co. is taking bids for a machine shop unit.

MILWAUKEE.—The John Obenberger Forge Co. has increased its capital from $250,000 to $500,000 and will enlarge its plant.

MILWAUKEE.—A. G. Goethel, 301 Fourth street, plans a sheet metalworking plant, 1 story, 60 x 120 feet.

MILWAUKEE.—Ground has been broken by the Lavine Gear Co. for a 1-story, 150 x 150-foot extension to its machine shop, to cost approximately $100,000.

MILWAUKEE.—The Interstate Pattern Mfg. Co., capitlized at $15,000, has been chartered to manufacture patterns by James G. Gregorson, Arthur G. Hensel and Edward Christenson. A 1-story shop 40 x 75 feet will be built.

OCONTO, WIS.—Bids are being taken by the Montana Tractor Co. for a 1-story machine shop, 150 x 200 feet.

OSHKOSH, WIS.—The Universal Motor Co., E. H. Fahrney president, 39 Coape street, will build a 3-story office and machine shop, 75 x 120 feet.

PORT WASHINGTON, WIS.—The Turner Mfg. Co. is having plans prepared for a modern foundry building.

RHINELANDER, WIS.—Contracts have been let by the Peoples Gas Co. for the construction of an artificial gas plant.

WATERTOWN, WIS.—The Otto Biefeld Co. is erecting two additions, 47 x 73 feet and 33 x 44 feet, to its structural, boiler and plumbing supply plant.

WEST ALLIS, WIS.—The Interstate Steel Mfg. Co. is reported planning a plant here, 80 x 200 feet, to be devoted to the manufacture of frames for motor trucks, etc.

WEST BEND, WIS.—The Schmidt-Stork Wagon Co. will build a 1-story plant 100 x 280 feet costing $55,000.

BATTLE CREEK, MICH.—The Calhoun Castings Co. has been organized by M. J. Franklin and others.

BENTON HARBOR, MICH.—The Surenac Machine Co. plans a plant building, 2 stories, 80 x 100 feet, at a cost of $50,000.

DETROIT.—The plant of the Briggs Mfg. Co. recently was damaged by fire. The loss was estimated at $25,000.

DETROIT.—The E. F. Lyons Spring & Axle Co. will build a 2-story plant 60 x 92 feet, costing $50,000.

DETROIT.—The Superior Machine & Engineering Co., 51 Fort street, will build a 2-story plant 100 x 120 feet.

DETROIT.—The Jansen Mfg. Co., manufacturer of belting, is having plans prepared for a 2-story plant addition, 75 x 100 feet, to cost $50,000.

GRAND RAPIDS, MICH.—The Grand Rapids Foundry Co. has a permit to erect an addition.

JACKSON, MICH.—The Case Mfg. Co. plans to remodel its machine shop.

JACKSON, MICH.—The General Machine & Tool Co., manufacturer of trucks and tractor parts, will build a plant 90 x 150 feet.

CHICAGO.—F. W. Clement, 941 North Robey street, plans a 2-story machine shop, 22 x 24 feet.

CHICAGO.—The Central Steel & Wire Co. has purchased a site, 260 x 432 feet, on which it plans a warehouse at a cost of $400,000.

CHICAGO.—The Designer Instrument Co. plans a factory building, 3 stories, 40 x 60 feet, to cost $30,000.

CHICAGO.—The Chicago Blow Pipe Co. plans a machine shop, 1 story, 75 x 75 feet, to cost $25,000.

CHICAGO.—Charles McAdams, 3127 Cottage Grove avenue, will build a 1-story plant 64 x 164 feet, costing $100,000.

ELGIN, ILL.—The Elgin Machine Works, 267 North State street, capitalized at $10,000, has been chartered to manufacture automobile parts and farm implements by Martin Skok, Oscar Ludwig and Arthur J. Steinke.

GALVA, ILL.—The Baker Tractor Corp., 1319 Dime Bank building, Detroit, George A. Baker president, will build a 1 and 2-story foundry here.

CONNERSVILLE, IND.—The A. L. Stone Road Machinery Co. has been incorporated with a capital of $100,000, by A. L. Stone, Charles K. Stone and others.

FT. WAYNE, IND.—The Tokheim Pump Co. plans a plant at a cost of $15,000.

HAMMOND, IND.—The Illinois Car & Mfg. Co. plans a factory building to cost of $100,000.

HAMMOND, IND.—The Eclipse Automatic Mfg. Co. plans a machine shop, 1 story, 42 x 72 feet, to cost $12,000.

KOKOMO, IND.—The Kokomo Brass Works plans a machine shop, 1 story, 132 x 137 feet, to cost $100,000.

MARION, IND.—The Marion Foundry & Machine Co. plans a warehouse and boiler room.

SOUTH BEND, IND.—The Matthews-Banner Mfg. Co. has been incorporated with a capital of $200,000, by Lewis C. Matthews, Walter A. Mortensen and others.

CINCINNATI.—The King Machine Tool Co. plans an addidtion, 2 stories, to cost $50,000.

CLEVELAND.—The Oster Mfg. Co. plans a factory building, 5 stories, 75 x 138 feet.

CLEVELAND.—The Interstate Foundry Co. is having plans prepared for additions to cost $100,000.

CLEVELAND.—The plant of the Commercial Forging Co. recently was damaged by fire.

CLEVELAND.—The Holan Metal Products Co. plans a mill building, 1 story, 40 x 100 feet, to cost $13,000.

CLEVELAND.—The Rampe Steel Products Co. recently was incorporated with a capital of $10,000. by G. P. Bucke, M. Kubik and others.

CLEVELAND.—The Holmes Bronze Foundry Co. has been incorporated with a capital of $30,000, by R. F. Holmes, R. E. Fleming, E. H. Peck, J. H. Mills and others.

CLEVELAND.—The Lakewood Screw Machine Products Co. recently was incorporated with a capital of $10,000, by M. Smith, K. G. Dean, H. G. Selby, F. W. Mould and S. A. Davies.

COLUMBUS, O.—The Jeffrey Mfg. Co. has awarded a contract for a 1-story plant addition, 215 x 253 feet.

DAYTON, O.—The Edgar Tool Co. recently was incorporated with a capital of $75,000, by Henry C. Bratt, L. W. Crandall, George Craig, A. A. Edgar and others.

DOVER, O.—The Baines Engineering Co., Cleveland, is reported planning to establish a plant here for the manufacture of cultivators, etc.

HUDSON, O.—The Hazen Mfg. Co. has started work on an addition to its foundry.

LISBON, O.—The Wright Mfg. Co. has started work on a forge shop and foundry.

MARIETTA, O.—The Marietta Foundry & Machine Co. has been incorporated with a capital of $25,000, by R. Ross, O. Morgenstern, C. W. Suder and others.

RAVENNA, O.—The National Furnace & Stove Co. will establish a plant here.

TOLEDO, O.—The Bock Bearing Co. plans an addition, 2 stories, 60 x 260 feet, to cost $110,000.

TOLEDO, O.—The Cousino Spot Light Device Co. has been incorporated with a capital of $100,000, by W. N. Hoot, W. C. Dunn and others.

WARREN, O.—The Frost Superior Fence Co., Cleveland, has a site here on which it plans a new plant.

YOUNGSTOWN, O.—The Youngstown Boiler & Tank Co. plans to increase its capital to $400,000, and is making improvements to its plant.

CLARKSBURG, W. VA.—The Phelps Can Co. contemplates a plant, 1 story, 100 x 175 feet, to cost $50,000.

HINTON, W. VA.—The Hinton Foundry & Machine Co. recently was incorporated with a capital of $5000, by A. D. Daly, V. V. Daly, H. M. Gaff and others.

Throughout the West

FAIRMONT, MINN.—The Fairmont Gas Engine & Motor Car Co. is having plans prepared for a foundry addition 50 x 150 feet.

MINNEAPOLIS.—The Russell Grader Mfg. Co., 2037 University avenue, will build a plant.

ATLANTIC, IOWA.—Shrauger & Johnson have started on a foundry, 110 x 200 feet.

CENTERVILLE, IOWA.—The Judy Mfg. Co, plans a foundry, 60 x 150 feet.

ST. LOUIS.—The Eureka Brass Co., 615 Red Bud avenue, plans a plant addition, 50 x 148 feet.

ST. LOUIS.—The Advance Electric Co., E. Bretch president, 6315 Maple avenue, will build a 1-story plant 50 x 100 feet costing $15,000.

ST. LOUIS.—The Standard Stamping Co. is taking bids for a plant, 5 stories, 53 x 60 feet, to cost $75,000.

ST. LOUIS.—The Fulton Iron Works contemplates an addition to its foundry, 112 x 120 feet, to cost $100,000.

ST. LOUIS.—The plant of the Gravois Foundry Co., 5007 South Thirty-eighth street, recently was damaged by fire. The loss was estimated at $75,000.

BRECKINRIDGE, TEX.—The Dunigan Tool & Supply Co. has been incorporated with a capital of $125,000, by J. B. Dunigan, T. J. Hinerman and E. W. Bisett.

ORANGE, TEX.—The Orange Iron Works is planning additions to cost $40,000.

HARRINGTON, WASH.—The Harrington Mfg. Co. has been incorporated with a capital of $300,000, by E. E. Limbrith, C. D. Ellis and C. A. Erich.

MT. VERNON, WASH.—The Franklin Iron Works will enlarge its plant by an addition, two stories, 20 x 90 feet.

SEATTLE.—The Pacific Machine Shop & Mfg. Co. will erect a machine shop at a cost of $15,000.

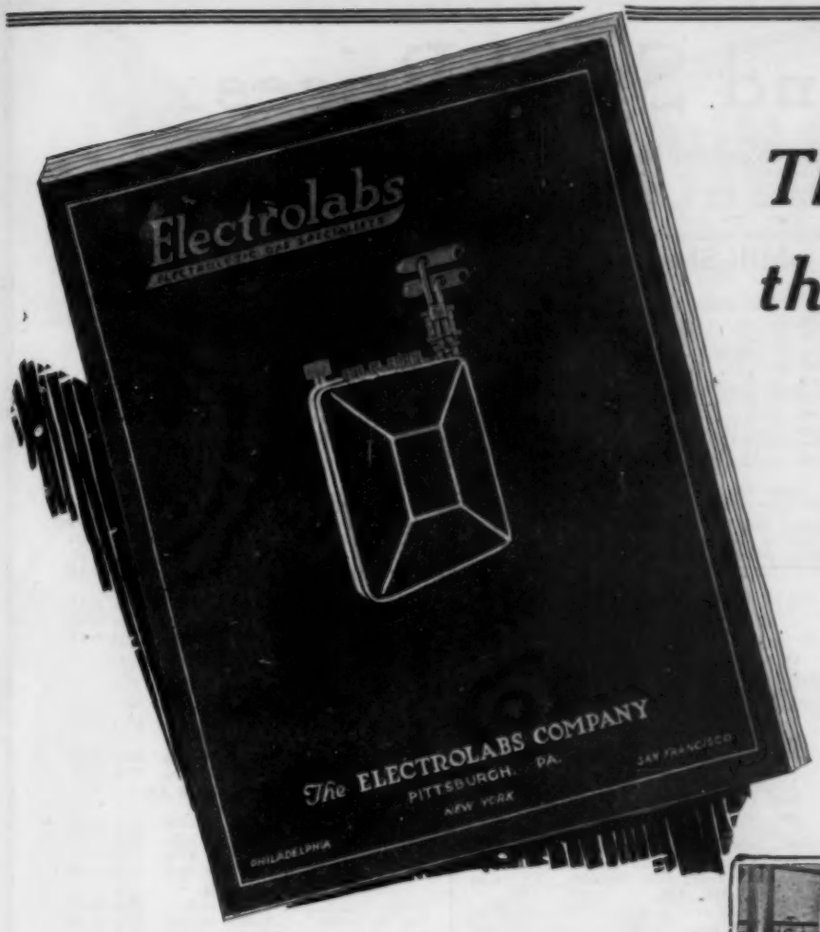
PORTLAND, OREG.—The Albina Marine Iron Works, capitalized at $50,000, has been chartered to manufacture boilers, tanks and machinery by William Cornfoot.

LOS ANGELES.—The Diamond Gas Heater Co., capitalized at $25,000, has been chartered to manufacture gas heating equipment by A. R. Evans of Los Angeles and T. B. Key and Alfred Barstow.

LOS ANGELES.—The Western Brass Mfg. Co. has been incorporated with a capital of $10,000, by Nathan Brostoff, David M. Clayman and L. R. Raymond, 115 Sycamore drive.

LOS ANGELES.—The Staweld Welding Corp. has

(*Concluded on Page* 1654)

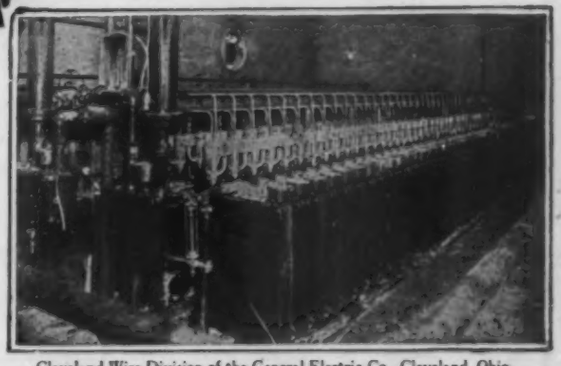


The book that tells of

OXYGEN *and* HYDROGEN EFFICIENCY

YOU SHOULD KNOW

Electrolabs
ELECTROLYTIC GAS SPECIALISTS



Cleveland Wire Division of the General Electric Co., Cleveland, Ohio, operate 200 Levin Cells

From foreword to finale, you will find this book a most enlightening treatise on modern methods of g nerating oxygen and hydrogen. Educational in the highest degree, this pamphlet positively deserves the unrestricted attention of anyone and everyone interested in the subject.

"ELECTROLABS" discusses the difficulties encountered in practical electrolytic dissociation schemes. It lays down the broad principles that paved the way to solution of these problems.

THE LEVIN OXY-HYDROGEN CELL

is dissected before your eyes, graphically and in discourse, and you marvel at its ingenious simplicity. You learn *just why* the Electrolabs Company proclaims for its product front rank prominence. You come in contact with the actual *reasons* for the greater economy that inevitably accompanies installations of *Electrolabs System Plants.*

Between its covers this book offers the *last word* on Oxy-Hydrogen Efficiency. Ignoring the impulse to promptly request a copy spells tangible loss to you—educationally, and in dollars and cents.

THE ELECTROLABS COMPANY

2635 PENN AVE. PITTSBURGH, PA.

BRANCH OFFICES
30 CHURCH ST.
New York City

Electrolabs

MORRIS Bldg.
Philadelphia, Pa.
Merchants' Exchange Bldg.
San Francisco, Cal.

Under the Technical Supervision of Electrolytic Oxy-Hydrogen Laboratories, Inc.

Iron and Steel Prices

Iron Ore

Superior Ores, Per Ton, Lower Lake Ports

Old range Bessemer, 55 per cent iron	$7.45
Mesabi Bessemer, 55 per cent iron	7.20
Old range nonbessemer, 51½ per cent iron	6.70
Mesabi nonbessemer, 51½ per cent iron	6.55

Port Henry Iron Ore, f.o.b. Port Henry

Old bed 21 furnace	$5.80
Old bed concentrates, 63 per cent	6.70
Harmony, cobbed, 63 per cent	6.70
New bed, low phos., 65 per cent	9.50
Lump ore for fix	7.00

Manganese Ore

Brazilian, 45 to 50 per cent, c.i.f. Atlantic ports, 70 to 85 cents per unit, nominal.

Indian, 70 to 80 cents per unit, c.i.f. Atlantic ports, 70 to 85 cents per unit.

Caucasian, 48 to 50 per cent, f.o.b. cars, Atlantic ports, 60 to 85 cents per unit, nominal.

GRAVEL FLUOR SPAR

85 per cent f.o.b. Kentucky and Illinois, per ton ..... $22.00 to 25.00

Warehouse Prices

Steel bars, Boston	5.50c
Steel bars, Chicago	3.37c to 3.87c
Steel bars, Cleveland	3.37c to 6.00c
Steel bars, Detroit	4.485c
Steel bars, Philadelphia	5.00c
Steel bars, Phila., ½ inch and smaller	6.00c to 10.00c
Steel bars, New York	3.37c to 4.75c
Steel bars, St. Louis	3.94c to 4.50c
Steel bars, Cincinnati	5.00c
Steel bars, St. Paul	3.59c to 4.095c
Steel bars, Buffalo	4.56c
Iron bars, Boston	5.50c
Iron bars, Buffalo	5.26c
Iron bars, Chicago	3.87c to 4.50c
Iron bars, Detroit	4.485c
Iron bars, St. Louis	4.50c
Iron bars, Cincinnati	4.50c
Iron bars, Philadelphia	5.00c
Iron bars, New York	4.25c to 4.50c
Shapes, Chicago	3.47c to 3.97c
Shapes, Detroit	4.335c
Shapes, Boston	5.50c
Shapes, St. Louis	4.04c
Shapes, St. Paul	3.695c to 4.195c
Shapes, New York	3.47c to 4.75c
Shapes, Cleveland	3.37c to 5.50c
Shapes, Philadelphia	4.50c
Shapes, Phila., 2-inch and smaller	5.00c
Shapes, Buffalo	4.41c
Shapes, Cincinnati	4.25c
Plates, Buffalo	4.61c
Plates, Chicago	3.67c to 4.17c
Plates, Detroit	4.535c
Plates, Boston	6.00c
Plates, St. Louis	4.24c
Plates, St. Paul	3.895c to 4.395c
Plates, New York	3.67c to 5.00c
Plates, Cleveland	3.57c to 5.50c
Plates, Phila., ¼-inch and heavier	5.50c
Plates, Phila., ⅛-inch	6.00c
Plates, Cincinnati	6.00c
No. 10 blue anl. sheets, N. Y.	7.12c to 8.50c
No. 10 blue anl. sheets, Phila.	7.00c
No. 10 blue anl. sheets, Chicago	4.57c to 7.02c
No. 10 blue anl. sheets, Cleveland	6.75c to 8.10c
No. 10 blue anl. sheets, Boston	8.00c
No. 10 blue anl. sheets, Buffalo	6.51c
No. 10 blue anl. sheets, Detroit	7.50c
No. 10 blue anl. sheets, St. L.	7.00c to 7.09c
No. 10 blue anl. sheets, Cincinnati	7.00c
No. 10 blue anl. sheets, St. Paul	4.79c to 7.225c
No. 10 blue anl. sheets, Boston	8.00c
No. 28 black sheets, Chicago	5.62c to 8.00c
No. 28 black sheets, New York	8.50c to 10.00c
No. 28 black sheets, Phila.	8.00c
No. 28 black sheets, Cleveland	6.75c to 8.90c
No. 28 black sheets, Boston	9.15c
No. 28 black sheets, Cincinnati	8.50c to 9.00c
No. 28 black sheets, Detroit	8.50c
No. 28 black sheets, St. Louis	8.10c
No. 28 black sheets, St. Paul	5.845c to 8.225c
No. 28 black sheets, Buffalo	8.25c
No. 28 galv. sheets, Chicago	9.50c
No. 28 galv. sheets, New York	9.75c to 11.00c
No. 28 galv. sheets, Phila.	10.00c to 10.50c
No. 28 galv. sheets, Boston	10.50c
No. 28 galv. sheets, Cleveland	9.00c to 10.00c
No. 28 galv. sheets, Cincinnati	8.50c to 9.00c
No. 28 galv. sheets, Detroit	10.00c
No. 28 galv. sheets, Buffalo	9.50c
No. 28 galv. sheets, St. Louis	9.60 to 10.00c
Bands, New York	5.32c to 6.50c
Bands, Boston	7.25c
Bands, Detroit	5.685c
Bands, Buffalo	5.76c
Hoops, Buffalo	6.01c
Hoops, Boston	8.25c
Hoops, New York	6.07c
Hoops, Detroit	5.935c
Cold rolled shafting, Buffalo	6.00c
Cold rolled shafting, New York	6.25c to 8.00c
Cold rolled shafting, Boston	8.00c
Cold rolled flats, squares and hexagons, New York	6.75c to 8.50c
Cold rolled rounds	6.25c to 8.00c

Mill Sheet Schedule

BLACK

Differentials for gage, per 100 pounds

No. 30	+20c
No. 29	+10c
No. 28 (carloads)	Base
No. 27	—05c
Nos. 25-26	—10c
Nos. 22-24	—15c
Nos. 17-21	—20c
Nos. 15-16	—25c
Nos. 13-14	—30c
Nos. 10-13	—35c

Standard Sizes

Gages Nos. 12 to 30 inclusive, 24, 26, 28 and 30 inches wide by 72, 84, 96 and 120 inches long. Gages Nos. 14 to 28 in addition to the foregoing, 36 wide by 96 inches and 120 inches long. Extras for width and length to be added.

Freight Rates

PIG IRON

Mahoning and Shenango valleys to:

Cleveland	$1.40
Newark, N. J.	4.80
Boston	5.20
Philadelphia	4.40
Pittsburgh	1.40
St. Louis	4.60
Minneapolis, St. Paul	5.70

Buffalo to:

Albany, N. Y.	$1.80
New England (rail)	3.90
New York and Brooklyn (rail)	3.90

Virginia furnaces to:

Philadelphia	4.10
New England	4.70
Brooklyn, Jersey City, Newark	4.40

Birmingham, Ala., to:

Boston	$8.00
Cincinnati	3.60
Chicago	5.00
Cleveland	5.00
Louisville, Ky.	3.30
Minneapolis, St. Paul	7.30
New York	7.70
Philadelphia	6.50
Pittsburgh	5.70
Savannah, Ga.	3.40
St. Louis	$4.30

Chicago to:

Des Moines	3.50
Minneapolis, St. Paul	2.50
Milwaukee	.60
Moline, Ill.	1.40
Omaha	4.50
St. Louis	1.90

Ironton and Jackson, O., to:

Chicago	$3.80
Cincinnati	1.80
Cleveland	2.40
Detroit	.60
Indianapolis	2.30
Minneapolis, St. Paul	5.70

FINISHED MATERIAL

Pittsburgh, carloads, per 100 lbs., to:

New York	27.0 cents
Philadelphia	25.0 cents
Boston	30.0 cents
Buffalo	21.0 cents
Baltimore	23.0 cents
Cleveland	17.0 cents
Cincinnati	23.0 cents
Chicago	27.0 cents
Detroit	23.0 cents
Minneapolis and St. Paul	49.5 cents
Denver	$1.09
St. Louis	33.5 cents
New Orleans	38.5 cents
Birmingham	57.5 cents
Pacific coast (all rail)	$1.25
Pacific coast (tin plate)	1.25

GALVANIZED AND LONG TERNE

No. 30	+50c
No. 29	+25c
No. 28 (carloads)	Base
No. 27	+15c
Nos. 25-26	—30c
Nos. 22-24	—45c
Nos. 17-21	—60c
Nos. 15-16	—75c
Nos. 12-14	—90c
Nos. 10-11	—1.00

Standard Sizes

Gages Nos. 12 to 30 inc., 24, 26, 28, 30 and 36 in. wide by 72, 84, 96 and 120 in. long. Extras for width and length to be added.

BLUE ANNEALED

Differential for gage per 100 pounds

Nos. 8 and heavier	— 5c
Nos. 9 and 10 (carloads)	Base
Nos. 11 and 12	+ 5c
Nos. 13 and 14	+10c
Nos. 15 and 16	+20c

Standard Sizes

Widths—24-26-28-30-36 and 48 inches.
Lengths—72-84-96-120 and 144 inches.
Extras for width and length to be added.

Tubular Goods

Pittsburgh basing discounts to jobbers in carloads

Steel Pipe

STANDARD WEIGHT

	Black	Galvanized
Butt Weld		
⅛, ¼ and ⅜-inch	47 to 50½	20½ to 24
½-inch	51 to 54½	36½ to 40
¾ to 3-inch	54 to 57½	40½ to 44
Lap Weld		
2-inch	47 to 50½	34½ to 38
2½ to 6-inch	50 to 53½	37½ to 41
7 to 12-inch	47 to 50½	33½ to 37
13 to 14-inch	37½ to 41	.....
15-inch	35 to 38½	.....

PLUGGED AND REAMED

Butt Weld		
1 to 3-inch	52 to 55½	38½ to 42
Lap Weld		
2-inch	45 to 48½	32½ to 36
2½ to 6-inch	48 to 51½	35½ to 39

EXTRA STRONG PLAIN ENDS

Butt Weld		
⅛, ¼ and ⅜-inch	43 to 46½	25½ to 29
½-inch	48 to 51½	35½ to 39
¾ to 1¼-inch	52 to 55½	39½ to 43
2 to 3-inch	53 to 56½	40½ to 44
Lap Weld		
2-inch	45 to 48½	33½ to 37
2½ to 4-inch	48 to 51½	36½ to 40
4½ to 6-inch	47 to 50½	35½ to 39
7 to 8-inch	43 to 46½	29½ to 33
9 to 12-inch	38 to 41½	24½ to 28

DOUBLE EXTRA STRONG PLAIN

Butt Weld		
½-inch	39 to 42½	28½ to 32
¾ to 1¼-inch	42 to 45½	31½ to 35
2 to 2½-inch	44 to 47½	33½ to 37
Lap Weld		
2-inch	37 to 40½	27½ to 31
2½ to 4-inch	39 to 42½	29½ to 33
4½ to 6-inch	38 to 41½	28½ to 32
7 to 8-inch	33 to 36½	19½ to 23

Wrought Iron Pipe

Pittsburgh basing discounts to jobbers in carloads

THREADS AND COUPLINGS

	Black	Galv.
Butt Weld		
¼-inch	+ 9	+ 35
⅜-inch	15½ to 25½	+ 1½ to 11½
½-inch	19½ to 29½	1½ to 11½
¾ to 1½-inch	24½ to 34½	8 to 18½
Lap Weld		
2-inch	20½ to 28½	6½ to 14½
2½ to 6-inch	22½ to 30½	9½ to 17½
7 to 12-inch	19½ to 27½	6½ to 14½

PLUGGED AND REAMED

Two points less than above

EXTRA STRONG PLAIN ENDS

	Black	Galv.
Butt Weld		
¼-inch	+ 17	+ 50
⅜-inch	13½ to 23½	6½ to +3½
½-inch	18½ to 28½	5½ to 15½
¾ to 1½-inch	24½ to 34½	9½ to 19½
Lap Weld		
2-inch	21½ to 29½	8½ to 16½
2½ to 4-inch	23½ to 31½	11½ to 19½
4½ to 6-inch	22½ to 30½	10½ to 18½
7 and 8-inch	14½ to 22½	2½ to 10½
9 and 12-inch	9½ to 17½	5½ to +2½

DOUBLE EXTRA STRONG, PLAIN ENDS

	Black	Galv.
Butt Weld		
½-inch	15½ to +39½	3½ to +51½
¾-inch	20½ to +22½	8½ to +34½
1-inch	+38½	+50½
1¼-inch	+22½	+34½
1½-inch	+21½	+33½
Lap Weld		
2-inch	16½ to +7½	4½ to +10½
2½ to 4-inch	18½ to +2½	9½ to +11½

"Built for Service"

THE Link-Belt Locomotive Crane has won an enviable reputation for hard, continuous, dependable service. Its simplicity of construction, accessibility of all working parts, ease of control, and the fact that there is plenty of room for the operator, have made it the choice of both superintendent and operator alike.

The Link-Belt Crane is a great labor-saver. One concern tells us—"4 men with our Link-Belt Crane do the work of from 24 to 32 men. At $5 00 a day this means a yearly saving of $30,000 in wages alone."

Write for Crane Catalog No. 370

Now is the time to store coal for use next winter. A locomotive crane equipped with a grab bucket makes an ideal machine for this purpose. Let us tell you more about storing and reclaiming coal with a Link-Belt Crane.

LINK-BELT COMPANY

PHILADELPHIA		CHICAGO		INDIANAPOLIS
New York, 299 Broadway	Huntington, W. Va., Robson-Prichard Bldg.	San Francisco, 582 Market St.
Boston 9, 49 Federal St.	Cleveland, 439 Rockefeller Bldg.	Los Angeles, 163 N. Los Angeles St.
Pittsburgh, 1601 Park Bldg.	Detroit, 730 Woodward Ave.	Toronto, Can., Canadian Link Belt Co., Ltd.
St. Louis, Central Nat'l Bank Bldg.	Kansas City, Mo., 936 Elmhurst Bldg.	Denver, Lindroth, Shubart & Co., Boston Bldg.
Buffalo, 647 Ellicott Square	Seattle, 576 First Ave., S.	Louisville, Ky., F. Wehle, Starks Bldg.
Wilkes Barre, 2nd Nat'l Bank Bldg.	Portland, Ore., First and Stark Sts.	New Orleans, C. O. Hine, Hibernia Bank Bldg.
Birmingham, Ala., S. L. Morrow, 730 Brown-Marx Bldg.		

LINK-BELT
LOCOMOTIVE CRANES

Say you saw it in THE IRON TRADE REVIEW

(*Concluded from Page* 1650)

been incorporated with a capital of $100,000, by Charles T. Kennedy and others, to manufacture welding apparatus.

BERKELEY, CAL.—The Bushnell Mfg. Co. has been incorporated with a capital of $50,000, by John B. Bushnell, Edward J. Hultman and W. T. Merriman, and will establish a motor vehicle plant here.

EMERYVILLE, CAL.—The Doble Co., Inc., has been incorporated with a capital of $100,000, by John A., William A. and Warren Doble, and will erect a plant for the manufacture of engines, tractors, etc.

LOS ANGELES.—The Union Oil Co., Union building, is reported planning the erection of a pumping plant.

LOS ANGELES.—The M. & M. Machine Co. has been organized to manufacture machinery and parts by D. G. MacGregor, 1340 Florida street, Long Beach, Cal., and others.

LOS ANGELES.—The Saffell Water Heater Mfg. Co., 1310 South San Pedro street, has been organized to manufacture water heaters and specialties, by A. H. Saffell and others.

LOS ANGELES.—The Jonas-Neuhoff Mfg. Co. has been organized with a capital of $50,000, by F. W. Jonas, J. A. Neihoff and M. M. Fogel, to manufacture automobile parts, etc.

LOS ANGELES.—The California Machinery & Specialty Co., capitalized at $50,000, has been chartered to manufacture machinery by J. M. Whitney, Alfred Barstow and George E. Cloud.

LOS ANGELES.—The Allingham Flotation Machine Co., capitalized at $500,000, has been chartered to manufatcure mining machinery by John Allingham and William Rosenberg.

LOS ANGELES.—The Western Brass Mfg. Co., capitalized at $10,000, has been chartered to manufacture brass and bronze supplies by Nathan Brostoff and L. R. Raymond, 115 Sycamore drive.

LOS ANGELES.—The Meek Oven Mfg. Co., 433 Heilman building, is being organized to manufacture oven equipment by Edgar C. Feddersen and Richard P. Feddersen.

LOS ANGELES.—The Cole Visible Gage Co. has been organized with a capital of $50,000, by Clifford M. Cole, N. M. Smith, and Harry A. Unger, to engage in the manufacture of auto appliances, etc.

LOS ANGELES.—The Vulcan Electric Co. recently was organized with a capital of $200,000, by W. W. Sweeney, I. W. Gleason and H. A. Masac, to engage in the manufacture of electrical specialties.

OAKLAND, CAL.—The Standard Drop Forge Co. has been organized with a capital of $1,000,000, by Clarence L. Johnson and others.

OAKLAND, CAL.—Erection of a plant at Woodland, Cal., is reported being planned by the All-In-One Tractor Co., this city.

OAKLAND, CAL.—The Bay Engineering Co. has awarded a contract for erection of a 2-story shop building, to be built at an estimated cost of $13,000.

SAN FRANCISCO.—The Acme Gas Engine Co. has leased a building and will move its plant into it.

SAN FRANCISCO.—Holbrook, Merrill & Stetson, stoves, furnaces, etc., are erecting an addition, 137 x 275 feet.

SAN FRANCISCO.—The Pacific Gas & Electric Corp., 445 Sutter street, will build additions. J. A. Britton is vice president.

SAN FRANCISCO.—The Byron Jackson Iron Works is building a branch factory, 50 x 100 feet, costing $100,000. Equipment will cost about $25,000.

SAN FRANCISCO.—Paul F. Kingston, 519 California street, has plans for the erection of a 1-story machine shop, to be built at an estimated cost of $10,000.

WOODLAND, CAL.—J. T. Garrett has plans for a foundry.

Business in Canada

TORONTO, ONT.—Jones Motors, Ltd., has been incorporated to manufacture motors, etc., with $40,000 capital, by William G. Jones, 96 Indian road; Wendell H. Osborne, 157 Bay street and others.

TORONTO, ONT.—The Ductite Steel Co., Ltd., has been incorporated to manufacture iron, etc., with $1,500,000 capital, by John A. Kent, 120 Bay street; Guy M. Jarvis and others.

TORONTO, ONT.—The Matthewson Hardware, Ltd., has been incorporated to manufacture galvanized iron ware, etc., with $75,000 capital, by George D. Matthewson, David A. Matthewson and others.

TORONTO, ONT.—The Beatty McIntyre, Ltd., has been incorporated to manufacture electrical appliances with $100,000 capital, by Merril McDonald, G. W. Adams and Edwin Smilly.

TORONTO, ONT.—The Industrial Engineering Co. of Canada, Ltd., has been incorporated to manufacture electrical apparatus, etc., with $20,000 capital, by Ronald G. Lee, 15 Harvard avenue; Harry C. Bertram and others.

TORONTO, ONT.—Bastian-Morley, Ltd., have been incorporated to manufacture stoves, etc., with $300,000 capital, by James P. Morley and Oliver A. Ludlow both of Laporte, Ind; John M. Godfrey and others.

TORONTO, ONT.—The Fuel Saving Corp., Ltd., has been incorporated to manufacture fuel saving devices, etc., with $40,000 capital, by George F. Long, Harry G. Keen, Archibald K. Roberts and others.

TORONTO, ONT.—The Toronto Castings, Ltd., have been incorporated to manufacture castings, iron, etc., with $500,000 capital, by Frederick A. Dewey, 7 Aberdeen avenue; Henrie G. Smith, room 44, 2 Toronto street and others.

TORONTO, ONT.—The Canadian Technical Products, Ltd., has been incorporated to manufacture machinery, etc., with $100,000 capital, by Arthur S. Hopkins, 498 Euclid avenue; Gerald J. Barry and others.

TORONTO, ONT.—The Invincible Spark Plug Co., Ltd., has been incorporated to manufacture spark plugs, etc., with $125,000 capital, by John A. Campbell, 24 King street west; Harold E. Manning, 152 Warren road and others.

TORONTO, ONT.—H. E. Givan, Ltd., has been incorporated to manufacture automobiles, etc., with $75,000 capital, by James S. Lowell, 25 King street west; Ernest H. Stewart, 354 Howland avenue, and others.

TORONTO, ONT.—The Advance Automobile Accessories, Ltd., has been incorporated to manufacture automobile accessories, etc., with $25,000 capital, by Charles H. C. Leggott, 116 Arundel avenue; William W. Perry, Scarborough Junction, Ont., and others.

TORONTO, ONT.—The Insulation & Moulded Products, Ltd., has been incorporated to manufacture insulation material, etc., with $80,000 capital, by Alexander McKenzie, room 806, 36 Toronto street; Alexander T. Davidson, 146 St. George street and others.

TORONTO, ONT.—The Canadian Raybestos Co., Ltd., has been incorporated to manufacture asbestos, automobile brake linings, etc., and has a building at Peterboro, Ont., which it will equip. Property adjoining the building will be utilized as a site for other buildings, including an asbestos spinning plant. The company has a capital of $250,000, and the directors are Sumner Simpson and Robert Abbott of Bridgeport, Conn.; Morton F. Judd, Stratford, Conn., and others.

WELLAND, ONT.—The plant of the Canadian Steel Foundries, which has been closed for a year will be opened in about a month.

WINDSOR, ONT.—To provide for possible extensions in the future, the Ford Motor Co. of Canada has acquired options on property situated close to its London and Toronto, Ont., branches.

ROSSLAND, B. C.—Plans for a concentrating mill to be erected here for the Consolidated Mining & Smelting Co. are being drawn.

VANCOUVER, B. C.—The Vivian Gas Engine Co., 1086 Sixth avenue west, has let the contract for a machine shop.

New Trade Publications

GAS PLANT EQUIPMENT.—Valves, intensive scrubber and washer-coolers, are described in three circulars published by the Steere Engineering Co., Detroit.

PHOTOGRAPHIC LENSES.—Bausch & Lomb Optical Co., Rochester, N. Y., has published an illustrated booklet in which photographic lenses are described and illustrated.

CLUTCHES.—An installation of oil pumps and air compressor driven clutches is described in a 4-page folder, published by the Hill Clutch Co., Cleveland.

METAL HOSE.—The Pennsylvania Flexible Metallic Tubing Co., Philadelphia, is circulating a folder in which metal hose for conveying oils, gasoline, paraffin, etc., is described and illustrated.

FORGING.—The National Machinery Co., Tiffin, O., has published a bulletin in which the forming of a crank shaft on the forging machine preparatory to putting it under the drop hammer, is described.

METALLOGRAPHIC APPARATUS.—Arthur H. Thomas Co., Philadelphia, has published a booklet in which metallurgical microscopes, metallographic cameras, etc., are described and illustrated. Specifications of the various types are given.

REVERSING DRIVE.—The General Electric Co., Schenectady, N. Y., has published a booklet in which reversing drive for planers, slotters, etc., is described in detail. The data given are supplemented by several illustrations.

STEEL FORMS.—An attractive booklet of 44 pages has been published by the Blaw-Knox Co., Pittsburgh, in which the use of steel forms in the construction of concrete, brick, and bituminous roads, and curbing, gutters, concrete pavements and sidewalks is described and illustrated.

OIL BURNERS.—A 4-page leaflet is being circulated by Alldays & Onions, Ltd., Birmingham, England, in which general information on the application of oil burners to stationary, locomotive and marine boilers of all types, is given. According to the leaflet, these burners can be fitted to practically every type of boiler. Some interesting data is given and a number of illustrations, including a diagramatic drawing are presented.